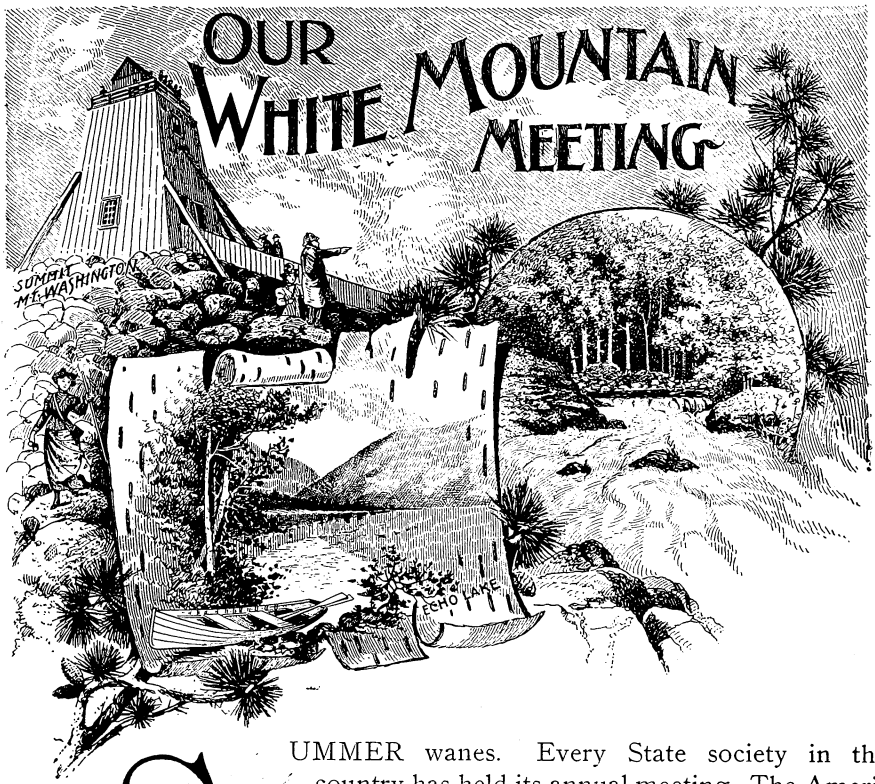


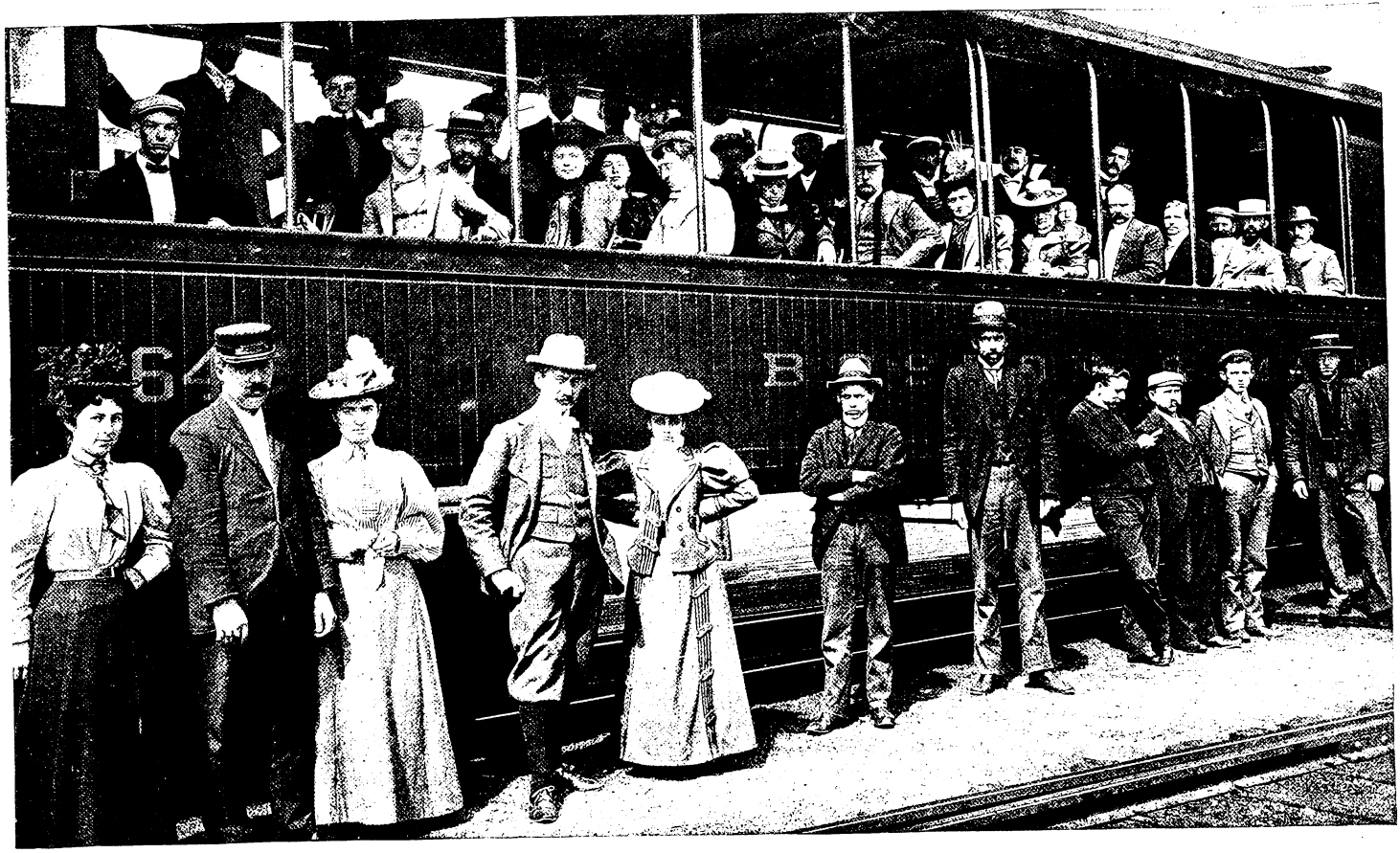
SUMMER wanes. Every State society in the country has held its annual meeting. The American and the Southern have met and have been amalgamated. The Pacific Coast has held a Dental Congress, ITEMS OF INTEREST has conducted a little affair up in the White Mountains. To all who were prevented from attending our mountain meeting we make this request: "In reading this the story of our meeting make comparison with the meeting, in your locality, which you did attend. Do you not think that this idea of holding a dental meeting, at which there is no 'election of officers,' no 'committee reports,' no 'annual dues,' no 'politics,' no 'lobby,' no 'caucus,' and more especially no 'special order of business' to stop discussions, has resulted very well? Would you not prefer a meeting of this character?"

Promptly at nine o'clock, on Saturday morning, July 24, our train rolled out of the Grand Central Depot. Along the route our party grew

until our special parlor car was filled, over fifty having accepted our invitation. The day passed pleasantly, and what might otherwise have seemed a long, hot journey, was all too brief because of the sociability and affability of the ladies. Many witty tales were told; many ancient jokes brought forth from dingy recesses of the mind to be received and welcomed with shouts of laughter as old friends; many experiences of office practice narrated; many little practical points fraternally exchanged, and, in fact, many pleasant incidents abounded and might be here recorded, were it not that more valuable material demands the space.

Arriving at the Twin Mountain House, no delays occurred to fret our tired travelers, as rooms had been assigned to all before their arrival. Therefore, it was not long before the entire party had refreshed themselves and in vacation attire appeared in the dining-room to do justice to the attractive meal supplied by our hospitable host. The evening was passed in a quiet way, all speculating as to the chances of a good day on the morrow. For it should be recorded that, in this vicinity, on St. Smithin's day it did rain, and in consequence of that sad error on the part of our local weather clerk, the eastern coast residents had been warned to "expect rain for forty days." Worse than that, the expectations had been more than fulfilled, and New York had not seen one whole dry day in two weeks.

On Sunday morning the party awoke to find it raining. Or, as one might say, St. Smithin was reigning. By the afternoon the clouds broke away enough to disclose one or two mountain tops, and the more courageous, or reckless, of the party filled two mountain stage coaches and were wheeled away toward the famous Crawford Notch, one of those wonderful passes through the mountains, which Nature sometimes leaves with sheer and rocky cliffs towering skyward and seemingly threatening disaster to audacious wayfarers below. On this excursion we saw the two beautiful waterfalls, the Flume Cascade and the Silver Cascade, each coursing swiftly down a mile or more of precipitous rock, with noisy roar that broke the stillness of the forest with awesome sounds. And then—well, then it began to rain again, and horses were urged, and collars turned up, and persons huddled closely together, until the Willy House offered us shelter and "a glass around," of that which is not supposed to be dispensed within the confines of the State of New Hampshire. An hour later St. Smithin winked one eye, or pretended not to see us, long enough to permit the return journey, but as soon as we had reached our hotel again, he must have given orders to open the flood gates of the heavens, for the torrents came down in earnest. Under these circumstances all thoughts of the projected excursion to the Summit of Mount



FIRST EXCURSION PARTY LEAVING FABYAN'S FOR MOUNT WASHINGTON.

Washington were abandoned save by one; and he "had been there before." He knew by sad experience that, "if one promises himself to go to the Summit, it will rain. If he does not start, it usually clears off beautifully." Consequently, he slept that night with one eye open and watching the point where the sun should rise, and as soon as His Golden Majesty had protruded his brilliant face above the pinkish horizon of the dawn, he was out of bed and ringing for a bell boy. The order was given to "call everybody," and what astonishment there was for sleepy eyes to be greeted by the glare of sunlight, such as had not been seen for fifteen days! Hurriedly they rose, put on their clothes, and hastened to the breakfast room. The meal was quickly dispatched and all clambered into the stages which were ready to take them to the train. Fearing that we might be late, a man had been sent ahead to the station to "hold up" the train. When the conductor heard that a party of thirty-two wished to go to the Summit, he gleefully announced that he would "hold the train half an hour for such a party," for, be it known, that this is the largest excursion party that ever made the trip. Thus we caught the train, though five minutes late. At Fabyans the courteous superintendent, Mr. Horn, placed a special car at our disposal, and just before we started a camera fiend took a snap at us, with the result shown in the accompanying illustration.

The ascent to the Summit was most enjoyable; the view from the Tip Top House was the best of the season, this being the very first absolutely clear day that had visited the section (there is nothing like being on familiar and friendly terms with Saints, especially those who control the weather), and altogether the excursion was pronounced to be a grand success. Everybody bought souvenir spoons, everybody wrote home on Summit House paper, at ten cents a sheet, and everybody bought mementos of the locality (which are really manufactured in Rhode Island). But we all do these things on vacation. It is a part of the fun.

When we returned to the hotel we found the attendance at the meeting had materially increased, many men having arrived from Boston, and from New England generally. So at our first meeting the large Beecher Parlor was crowded to its utmost. Dr. Ottolengui was unanimously chosen chairman, and delivered an "Address of Welcome" on behalf of the magazine. Dr. M. L. Rhein then read his paper, which elicited a spirted discussion, so that the meeting lasted until eleven o'clock.

On Tuesday morning, again it was bright, and a second excursion of twenty-five went on their way rejoicing to the Summit. Another party took a coach and went to the Crawford House, and thence climbed to the top of Mount Willard, from which the view by many is preferred to that from the top of Mount Washington. In the reproduction of it

CRAWFORD NOTCH FROM MOUNT W ILLARD.

which we give, the man sitting on the rock is looking down upon the Crawford Notch. Were he to lose his balance, or should a powerful wind come up suddenly and blow him from his seat, he would fall about three hundred feet before striking any projection from the precipitous side of the mountain.

On that evening the meeting was held in the larger parlor, and all the guests of the house were invited, as Dr. William J. Morton was to entertain us with a lecture on the X-ray, illustrated with lantern slides. The fact that he was addressing a mixed audience will explain the absence of technicality from his remarks, which are reproduced in their place.

Before the lecture Dr. Ottolengui announced the awards of the prizes in the Literary Competition, and presented the medals. The first prize, gold medal, was awarded to Dr. C. Bunting Colson, of Charleston, S. C. The second prize, gold medal, to Dr. Allison R. Lawshe, Trenton, N. J. Silver medals to Dr. James M. Magee, St. John, N. B.; Dr.

Will A. Pressley, Rock Hill, S. C., and Dr. E. J. Townsend, Los Angeles, Cal. The prize winners, it will be noted, dwell in widely separated sections. It is with great pleasure that we are enabled to present the portraits of these gentlemen.

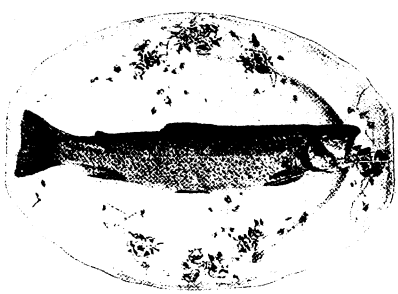
At the termination of Dr. Morton's lecture, Dr. Van Woert gave a most interesting practical demonstration of X-ray. He had kindly brought with him a powerful static machine, and a variety of the newer forms of Crookes tubes. The fluoroscope was shown, and the doctor also took a number of X-ray pictures. The audience which surrounded the doctor seemed to be intensely interested.

Little more remains to be told, or rather little more can be told in the space which can be devoted to this narrative. On Wednesday the dental meeting was held in the afternoon, because Dr. McNames, of New York, had kindly consented to give us "An Evening with Magic." The

doctor is a most proficient amateur prestidigitateur—in fact, he is that kind of amateur which one suspects of being a professional, judging by the skill displayed. With the able assistance of his wife the doctor showed us many marvelous tricks, and also gave an exhibition of Mental Telepathy and other mysteries which altogether made a most enjoyable entertainment lasting more than two hours. On the next morning it rained (for a change) and some impromptu clinics served to entertain us all "indoors." Dr. A. W. McNames demonstrated an ingenious original crown, which he has promised to fully explain in our pages in an early issue. Without illustrations a description at this time would be futile.

In the afternoon Dr. F. T. Van Woert gave us a fine paper on Cataphoresis, which brought out some very valuable points in the discussion. On Thursday and Friday we enjoyed other dental meetings and discussions, all of which are herewith recorded, and on Friday night a fine banquet was served, followed by enjoyable speeches.

Many other excursions were enjoyed, and many incidents occurred which were worthy of relation, but space forbids. It must be mentioned, however, that the fine views reproduced were taken by Dr. A. R. Lawshe, who proved himself to be as expert with his camera as he is in Prosthetic Dentistry. The smaller pictures, used as tail pieces, are "snap shots', taken by Dr. F. A. Knowlton, of Fairfield, Me. The trout on the dish was fourteen inches in length, the largest fish taken this season, and was captured by—but that would be a fish story.



Address of Welcome.

By R. OTTOLENGUI, M. D. S., NEW YORK.

Ladies and Gentlemen: It is with profound pleasure that I bid you welcome to this, the first convention of dentists, which meets at the invitation of a magazine, devoted to the interests of dentists. It seems to me that this occasion marks an epoch and sets apart a date, which forevermore must occupy a conspicuous place in the chronology of dentistry.

The Evolution of Dentistry.

It is scarcely more than half a century since the dentist practiced his calling in conjunction with, and as an unimportant addition to some more lucrative trade. Natural teeth were extracted by barbers, and artificial teeth, a term most aptly applied, were constructed by jewelers. From such obscure origin there was presently evolved a mechanical trade, dentistry, and a few men abandoned the making of watches for the extracting, and replacing of teeth. Patients objecting to the removal of teeth which did not ache, these primitive practitioners undertook to stuff them with gold. It becoming apparent that teeth thus stuffed (a word in actual use for twenty-five years or more), frequently did not suffer further inroads of decay, the demands for stuffing, in place of extraction, increased until men became skilled in the insertion of gold fillings. Thus the trade became an art, and its followers occupying a higher place in the social world, more and better educated men embraced the calling, until finally it became evident that the dentist of the future would need a medical education, as well as mechanical training. An effort was then made to have dentistry considered as a specialty of medicine, and to introduce the training of dentists into the curriculum of the medical schools. These propositions of the early pioneers were treated with scorn. The medical men laughed in derision at the audacity of these mechanics. Thus dentistry was unrecognized, by medicine.

But the true spirit of progress had entered the breast of these pioneers, and nothing daunted by the repulse, they decided upon a bold undertaking. Denied a place within the charmed ranks of the medical profession, they took a step which resulted in the creation of a new profession. The first dental college in the world was established in America. From that moment dentistry rapidly advanced from its position as one of the arts, to the more elevated plane of true science.

Before the discovery of America the world knew three learned professions, Theology, Law and Medicine. *Within the last fifty years this*

section of America has given to the world another profession, an achievement which no other single country on this globe can boast.

The test by which we know a profession, is that it shall have an extensive literature which has resulted from the pens of its own members, and that it shall have a separate college system devoted to teaching its recorded knowledge. Moreover, these colleges must grant a diploma to its graduates, which certifies to his membership in his profession. Besides the three original professions, no other calling fulfills these requirements, except dentistry, which by its large and increasing literature, its vast college system, and its diploma, is proven to have earned a place beside the others, as the great American Profession.

Besides the great number of valuable scientific works which dentists have published in book form, we may boast of an important current literature, there being thirty or more periodicals devoted to dental science. These magazines have grown with the profession, and with increased circulation have acquired the opportunity to exert an increasing influence upon the dentists of the world. And that the influence of the magazine which I have the humble honor of editing, should make it possible to attract so many prominent men into these mountain fastnesses, is a significant fact. The dental historian of the future must mention July 26th as the date upon which it was proven that the current literature of our profession had risen to an importance second only to that of the college itself; for when men travel from the far west, and the distant south to a meeting of this character, it is because they recognize the value of post-graduate education, and that a dental magazine, properly conducted, is in actuality a post-graduate school.

In this brief resumé, I have shown how this profession of dentistry in half a century has arisen from what was scarcely a trade. And the most significant fact in this narration is that, being so nearly allied to the medical profession, it should have attained this prominence, not only without the aid of the great medical school system, upon which it should have been enabled to rely for such knowledge of medicine as was requisite, but, per contra, that it has made its progress in spite of the fact that it was denied recognition until a date when recognition was of no great value.

Anæsthesia Discovered by a Dentist.

Yet, within a very few years of the opening of the first dental college, it was destined that a dentist should give the medical world, that knowledge which has elevated it to its highest dignity. The greatest medical achievements to-day are attained by our surgeons, and without anæsthesia, this could never have been possible. Anæsthesia was given to the world by a dentist.

Wm. T. G. Morton

This alone is accomplishment enough for one professional body during several centuries. Yet it is noteworthy that of all the world, the dental profession alone, refuses to give unstinted honor to the man who gave this boon to suffering humanity.

Two years ago, at the solicitation of a few men, residing in Hartford, the dentists of this country contributed to a fund, which was used for the erection of a bronze tablet, to the memory of Horace Wells, a dentist. To this there could be no possible objection, but it is doubtful whether the subscribers to the fund, with a full knowledge of all the facts, would willingly subscribe to the inscription which was placed upon the tablet. It reads as follows:

"THIS TABLET, COMMEMORATING THE FIFTIETH ANNIVERSARY, IS PLACED BY TWO HUNDRED AND FIFTY AMERICAN DENTISTS TO THE MEMORY OF HORACE WELLS, DENTIST, WHO, UPON THIS SPOT, DECEMBER 11, 1844, SUBMITTED TO AN OPERATION, DISCOVERED, DEMONSTRATED AND PROCLAIMED THE BLESSINGS OF ANÆSTHESIA.

Men who erect tablets of bronze for the enlightenment of future generations, should be careful lest their inscriptions pervert the facts of history. Much credit is due to Dr. Horace Wells, and none honors him more than I, but it is not true that he either discovered, demonstrated or proclaimed the blessings of anæsthesia. That distinction belongs to another dentist, Dr. William T. G. Morton.

A well worded summary of the facts was presented by Dr. John Ashurst, of Philadelphia, in an address in which he used these words:

"Meanwhile facts were accumulating, the significance of which we can now plainly recognize, but which excited no attention at the time. Sir Humphrey Davy had, in the very early days of the nineteenth century, experimented with nitrous oxide gas, afterward employed by Horace Wells, and had in so many words suggested its use as an anæsthetic in minor operations; its power of preventing the sensation of pain was well known to many persons, and it was the custom at some of our medical schools—at the University of Pennsylvania for one—for students to breathe the 'laughing gas,' as it was then called, for diversion. The use of ether by inhalation had been still earlier recommended by Beddoes, Pearson and Thornton, as a remedy for certain diseases of the lungs, and in 1805 your own Warren had employed it 'to relieve the distress attending the last stage of pulmonary inflammation.' Its intoxicating qualities, when inhaled, and its power, when in sufficient concentration, to produce stupefaction, had been recognized in 1839, in Pereira's well known treatise on Materia Medica, and were quite familiar to American medical students; and it is no doubt possible—I certainly have no wish to deny it—that in isolated cases it may have been used as a means of

relieving pain by individual practitioners, as by Dr. Long, of Athens, Ga , whom Perrin, with that happy disregard of the geography of all countries except their own, which is characteristic of French writers, calls the 'Greek physician.'

"But yet—and yet—surgeons went on, in every country, cutting and burning, and patients went on writhing and screaming, until on the 16th day of October, in the year 1846, in the Massachusetts General Hospital, Dr. J. C. Warren painlessly removed a tumor from a man who had previously been etherized by Dr. William G. T. Morton—and Surgical Anæsthesia became the priceless heritage of the civilized world."

It is not my purpose here to enter into any argument on this controversy. I have satisfied myself, after an exhaustive examination of documentary evidence, that the profession as a body are not familiar with the facts, and my trust in the integrity and justness of the dental world is so great, that I am sure that I need only call attention to the misapprehension under which we have all been made to labor, in order to stimulate an inquiry, which, in the end, will make the dentists unite with all the rest of the world in honoring Morton, without in any way depreciating the valuable work of Wells.

That the dentists are alone in claiming that Wells discovered anæsthesia may be attested by quoting an impartial and just statement of the truth, which is to be found in that standard work of reference, the Encyclopedia Britannica.

Statement in Encyclopedia Britannica.

"The artificial induction of anæsthesia by the use of drugs or the inhalation of vapors is a subject of great interest, both historically and from its practical application to the relief of suffering and the treatment of disease. Although it is mainly owing to the researches of distinguished chemists and physicians of the present century that the employment of anæsthesia has come to occupy a foremost place among remedies, there is abundant evidence to show that it is a practice of great antiquity. Besides the mention by Homer of the anæsthetic effects of nepenthe, and the reference by Herodotus to the practice of the Scythians of inhaling the vapors of a certain kind of hemp to produce intoxication, the employment of anæsthetics in surgery by the use of mandragora is particularly alluded to by Dioscorides and Pliny. It also appears from an old Chinese manuscript laid before the French Academy by M. Julien, that a physician named Hoatho, who lived in the third century, gave his patients a preparation of hemp, whereby they were rendered insensible during the performance of surgical operations. Mandragora was extensively used as an anæsthetic by Hugo de Lucca, who practiced in the thirteenth century. The

soporific effects of mandrake are alluded to by Shakespeare, who also makes frequent mention of anæsthetizing draughts, the composition of which is not specified.

"In the *Medical Gazette*, vol. xii., p. 515, Dr. Sylvester, quoting from a German work, by Meissner, published in 1782, mentions the case of Augustus, King of Poland, who underwent amputation while rendered insensible by a narcotic. But the practice of anæsthesia had never become general, and surgeons appear to have usually regarded it with disfavor. When, toward the close of the last century, the brilliant discoveries of Priestley gave an impetus to chemical research, the properties of gases and vapors began to be more closely investigated, and the belief was then entertained that many of them would become of great medicinal value. In 1800, Sir Humphrey Davy, experimenting on nitrous oxide gas, discovered its anæsthetic properties, and described the effects it had on himself when inhaled, with the view of relieving local pain. He suggested its employment in surgery in the following words: 'As nitrous oxide gas, in its extensive operation, seems capable of destroying physical pain, it may probably be used with advantage in surgical operations in which no great effusion of blood takes place.' His suggestion, however, remained unheeded for nearly half a century. The inhalation of sulphuric ether for the relief of asthma and other lung affections had been employed by Dr. Pearson, of Birmingham, as early as 1785; and in 1805 Dr. Warren, of Boston, U. S., used this treatment in the later stages of pulmonary consumption.

"In 1818 Faraday showed that the inhalation of vapor of sulphuric ether produced anæsthetic effects similar to those of nitrous oxide gas; and this property of ether was also shown by the American physicians, Godman (1822), Jackson (1833), Wood and Bache (1834).

"These observations, however, appear to have been regarded in the light of mere scientific curiosities and subjects for lecture room experiment, rather than as facts capable of being applied practically in the treatment of disease, till December, 1844, when Dr. Horace Wells, a dentist of Hartford, Conn., underwent in his own person the operation of tooth extraction while rendered insensible by nitrous oxide gas. Satisfied, from further experience, that teeth could be extracted in this way without pain, Dr. Wells proposed to establish the practice of painless dentistry under the influence of the gas; but, in consequence of an unfortunate failure in an experiment at Boston, he abandoned the project. On 30th of September, 1846, Dr. Morton, a dentist of Boston, employed the vapor of sulphuric ether to procure general anæsthesia in a case of tooth extraction, and thereafter administered it in cases requiring surgical operation with complete success. This great achievement marked

a new era in surgery. Operations were performed in America in numerous instances under ether inhalation, the result being only to establish more firmly its value as a successful anæsthetic. The news of the discovery reached England on 17th of December, 1846. On 19th of December, Mr. Robinson, a dentist in London, and on the 21st, Mr. Liston, the eminent surgeon, operated on patients anæsthetized by ether; and the practice soon became general both in Great Britain and on the Continent."

Here we find accurately recorded statements which disprove the truth of the words inscribed on the Memorial Tablet, at Hartford. First, it is shown that the anæsthetic properties of gas were known and announced years before Wells was born. Second, that his alleged discovery resulted in his own abandonment of the method, which had been adopted by no one else. Third, that immediately after Morton's demonstration, the whole world made use of the invention. I say invention, for there was no discovery. The anæsthetic properties of ether were known. Morton invented a practical means of utilizing these properties. Let us no longer withhold our homage, and stand alone, but rather let us honor Dr. Morton, the dentist, to whom all the rest of the world yields merited praise.

Before passing from this subject I cannot resist the temptation to introduce here a most interesting narrative, from the pen of Mrs. Morton, in which she recounts the story of her husband's experimentation and final success.

True Story of the Discovery of Anæsthesia.

"He used to make experiments nearly every day on 'Nig,' a black water spaniel, a good-sized dog that had belonged to his father. I was only a girl of eighteen at this time, and had not the least idea of what he was trying to do; nor would I have understood the importance of his experiments had he told me. I only knew that his clothes seemed always saturated with the smell of ether, and I did not like it. One day he came running into the house in great distress (for he was always tender-hearted), leading the dog, which walked rather queerly, and said:

" 'Poor Nig; I've had him asleep a long time. I was afraid I had killed him.'

"I laughed, thinking it was all a joke, but my husband became very grave, and said:

" 'The time will come, my dear, when I will banish pain from the world.'

"It was at this time also that he used to bottle up all sorts of queer bugs and insects, until the house was full of crawling things. He would

administer ether to all these little creatures, and especially to the big green worms he found on grape vines.

"I remember how Dr. Morton's friends laughed at these queer experiments, and I am afraid I joined with them sometimes. But he continued on his way undaunted, frequently saying: 'I shall succeed; there must be some way of deadening pain.'

"As he began to near success I became alarmed, for, not satisfied with trying the ether on bugs and animals, my husband began experimenting upon himself. He sent out his assistants offering a reward of five dollars to any person who would have a tooth drawn while under the influence of his pain-annulling agency. There were many people suffering from aching teeth, which needed to be extracted, and the five dollars was an object; but no one could be induced to take the risk. Finally, his two assistants allowed him to experiment upon them, but the result was not satisfactory, because of impurities in the ether. Having detected this, my husband, with characteristic persistence, at once procured a supply of pure ether, and, unwilling to wait longer for a subject, shut himself up in his office, and tested it upon himself, with such success that for several minutes he lay there unconscious. That night he came home late, in a great state of excitement, but so happy that he could scarcely calm himself to tell me what had occurred; and I, too, became so excited that I could scarcely wait to hear. At last he told me of the experiment upon himself, and I grew sick at heart as the thought came to me that he might have died there alone. He went on to say that he was resolved not to sleep that night until he had repeated the experiment, and declared that, late as it was, he must still find a patient. Returning to his office, he could find no one who could be induced to have a tooth drawn by the 'painless method,' which was what the doctor was now so eager to demonstrate. Discouraged, he was on the point of etherizing himself once more, and having one of his assistants extract a tooth from his own head, when there came a faint ring at the bell.

"It was long past the hour for patients, but there stood a man with his face all bandaged and evidently suffering acute pain. And strangest of all were his words:

"'Doctor,' he said, 'I have the most frightful toothache, and my mouth is so sore I am afraid to have the tooth drawn. Can't you mesmerize me?'

"The doctor could almost have shouted with delight, but, preserving his self-possession, he brought the man into his office and told him he could do something better than mesmerize him. Then he explained his purpose of administering the sulphuric ether, and the man eagerly

consented. Without delay my husband saturated a handkerchief with ether, and held it over the man's face, for him to inhale the fumes. The assistant, Dr. Hayden, who held the lamp, trembled visibly when Dr. Morton introduced the forceps into the mouth of the man and prepared to pull the tooth. Then came the strain, the wrench, and the tooth was out, but the patient made neither sign nor sound; he was quite unconscious.

"Dr. Morton was overjoyed at the result. Then, as the man continued to make no movement, he grew alarmed, and it flashed through his mind that perhaps he had killed his patient. Snatching up a glass of water, he emptied it full into the face of the unconscious man, who presently opened his eyes and looked about him in a bewildered way.

J. C. Warren

"'Are you ready now to have the tooth out?' asked the doctor.

"'I am ready,' said the man.

"'Well, it is out now,' said the doctor, pointing to the tooth lying on the floor.

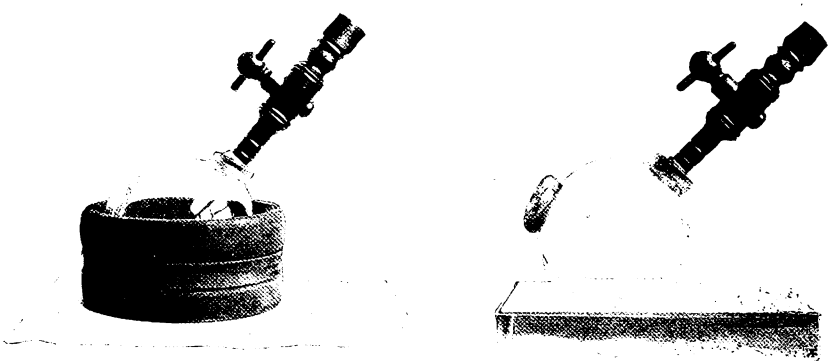
"'No!' cried the man in greatest amazement, springing from the chair, and, being a good Methodist, shouting, 'Glory! Hallelujah!'

"From that moment Dr. Morton felt that the success of sulphuric ether was assured. Thenceforward he was unceasing in his efforts to bring his discovery before the medical world, and, after many discouragements, he succeeded in inducing Dr. John C. Warren, senior surgeon in the Massachusetts General Hospital, to allow him to visit the hospital and try his discovery upon a patient who was about to be operated upon.

"The night before the operation my husband worked until one or two o'clock in the morning upon an inhaler he had devised, and then regarded as essential to the operation, although it has since been discarded. I assisted him, nearly beside myself with anxiety, for the strongest influences had been brought to bear upon me to dissuade him from making this attempt. I had been told that one of two things was sure to happen—either the test would fail and my husband would be ruined by the world's ridicule, or he would kill the patient and be tried for manslaughter. Thus, I was drawn in two ways; for while I had unbounded confidence in my husband, it did not seem possible that so young a man (he was only twenty-seven years old at this time) could be wiser than the learned and scientific men before whom he proposed to make his demonstration.

"After resting a few hours, Dr. Morton was off early in the morning to see the instrument maker, for there were still changes necessary in the inhaler. From that moment I saw nothing of him for twelve hours, which were hours of mortal agony. How they dragged along as I sat at the window, expecting every moment some messenger to tell me that the patient had died under the ether and that the doctor would be held responsible! Two o'clock came, three o'clock, and it was not until nearly four that Dr. Morton walked in with his usually genial face so sad that I felt failure must have come. He took me in his arms, almost fainting as I was, and said tenderly: 'Well, dear, I succeeded.'

"In spite of these words his gloom of manner and evident depression made it impossible for me to believe the good news. It seemed as if he should have been so highly elated at having accomplished one of



This inhaler was bought from Dr. Morton, a few days after his success at the Massachusetts General Hospital, by Dr. W. L. Johnson. It is now in the possession of Dr. G. P. Wiksell, of Boston, who kindly loaned it for these illustrations.

the most splendid achievements of the century, and yet there he was, sick at heart, crushed down, one would have said, by a load of discouragement. This was due not only to bodily fatigue and the reaction after his great efforts, but to an intuitive perception of the troubles in store for him. It is literally true that Dr. Morton never was the same man after that day; his whole after life was embittered through this priceless boon he had conferred upon the human race.

"Of the three men now living who saw this first operation upon a patient under the influence of ether, one is Dr. Robert Davis, of Fall River. He was then a medical student in Boston, and he has given me a description of what happened on this memorable occasion. The amphitheater of the operating room was crowded with members of the medical profession, doctors and students, all curious and all skeptical, as to the

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outcome of the experiment to be made. All the great surgeons of Boston were present, including the celebrated Dr. Jacob Bigelow, whose son, Dr. Henry J. Bigelow, a young and enthusiastic surgeon of about Dr. Morton's age, was a warm friend of Dr. Morton's, and perhaps the only man present who had faith in him. It must be said, however, that he had more grounds for his belief than the others, since he had been privileged to witness some of my husband's previous tests with ether in private.

"The hour for the operation arrived and Dr. Morton was not on hand. Five minutes passed, ten minutes, and then Dr. Warren, the eminent surgeon, looking around with a smile on his face, slightly sarcastic, suggested that, as Dr. Morton was not present, it might be well to let the operation go on in the usual way. The patient had meantime been brought in, and was lying on the operating table deathly white, doubly apprehensive of what was to come. At that moment Dr. Morton came in, breathless from haste, carrying the inhaler, which had just been delivered to him by the maker and had nearly been the cause of the failure of the test.

"Without any delay, and with a coolness and self-possession in strong contrast with the general nervous tension of the assembly, Dr. Morton proceeded to administer sulphuric ether to a human being, for the purpose of destroying pain by forced anæsthesia in a surgical operation, for the first time in the world's history. Pouring the liquid into the inhaler, he lifted the latter to the patient's nostrils, and held it there for some minutes, allowing the man to breathe the fumes. Then, looking into his face intently, and feeling the pulse, he turned to Dr. Warren, who stood near with his surgeon's knife behind him, and said, in a quiet tone that sounded plainly through the silence:

" 'Your patient is ready, doctor.'

"Then, in all parts of the amphitheater there came a quick catching of breath, followed by a silence almost deathlike, as Dr. Warren stepped forward and prepared to operate. The sheet was thrown back, exposing the portion of the body from which a tumor was to be removed, an operation exceedingly painful under ordinary conditions, although neither very difficult nor very dangerous. The patient lay silent, with eyes closed as if in sleep; but every one present fully expected to hear a shriek of agony as the knife struck down into the sensitive nerves. But the stroke came with no accompanying cry. Then another and another, and still the patient lay silent, sleeping, while the blood from severed arteries spurted forth. The surgeon was doing his work, and the patient was free from pain, so it seemed at least; and all in wonder strained their eyes and bent forward, following eagerly every step in the

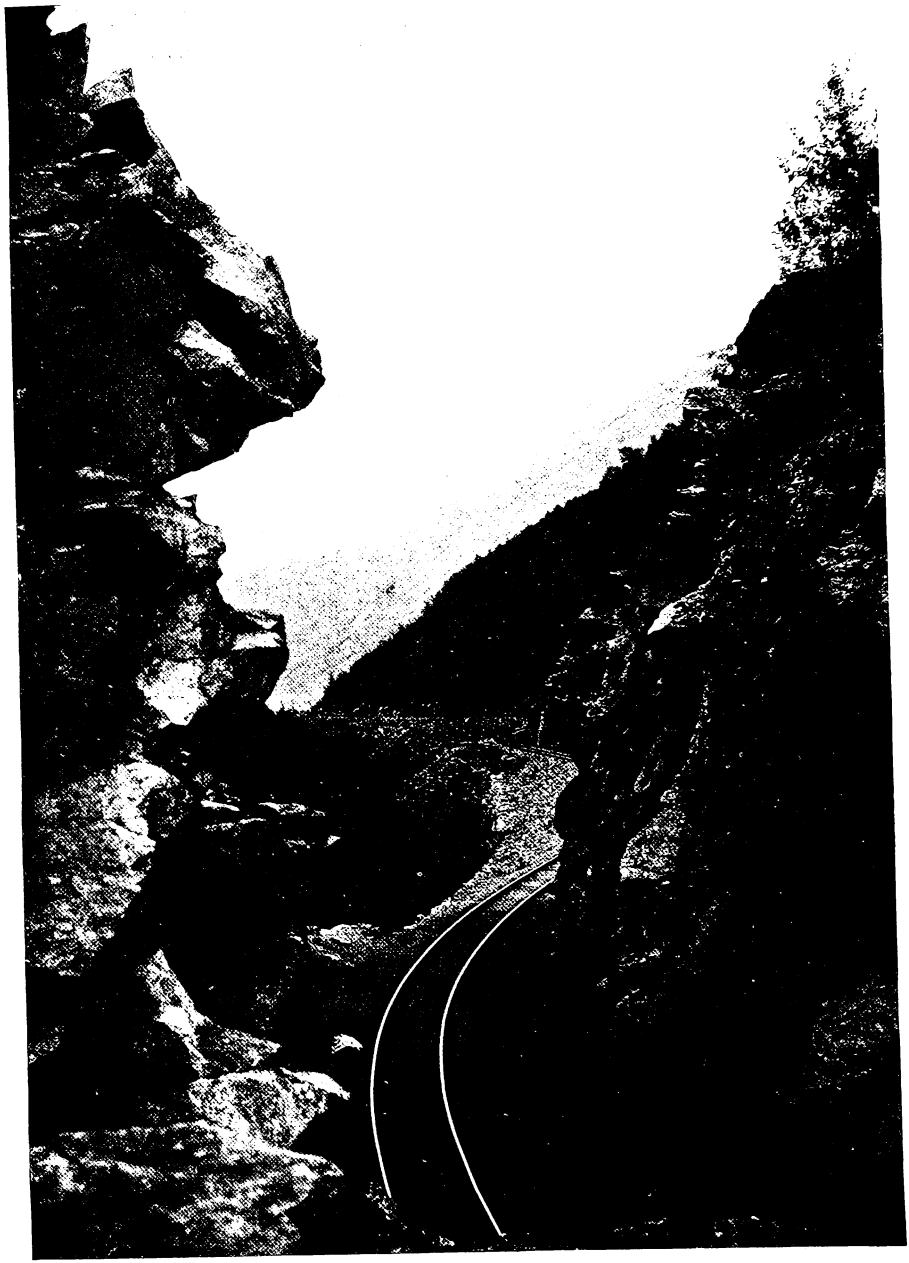
operation. Those in the front rows leaned far over or knelt on the floor, so that those behind might see better. The operation advanced quickly and easily to its finish. The tumor was taken away, the arteries fastened with ligatures, the gaping wound sewed up, then dressed and bandaged. Half an hour covered the whole of it. During that time no cry or groan escaped the patient, no indication of suffering.

"Dr. Morton aroused the patient after the operation was completed, and said: 'Did you feel any pain?' The patient replied, 'No.' Then Dr. Warren, turning to the company, said in an impressive manner: 'Gentlemen, this is no humbug.' All pressed about Dr. Morton and congratulated him upon his success."

Thus a dentist gave the world immunity from the surgeon's knife, and then his confreres have ever since calmly continued to operate upon one of the most sensitive tissues of the body, the dentine of a tooth, causing agony so excruciating that the very word of dentist is associated in the mind with thoughts of pain.

But at last it would seem that this stigma is to be removed. Through another marvelous agency, electricity, the pain of "tooth-carpentering" is to be removed. Cataphoresis promises this immunity by which the dentist is to take his place on the same high stool upon which he has seated the surgeon, and his patients are to be in fear of him no more forever. It is with great pleasure, that I am able to promise you all an evening devoted to the latest phase of this subject, by gentlemen who have devoted especial study to this new science, and it is particularly gratifying to know that, in addition to Dr. Van Woert and other practical dentists, who will address you, we will be able to listen to Dr. William James Morton, the son of the discoverer of general anæsthesia, himself one of the pioneers in the new method of local anæsthesia.

In conclusion, I must express my gratitude to all who have accepted our invitation to be present here at this meeting, and especially to those gentlemen who have so courteously supplied us with such an attractive programme.



CRAWFORD NOTCH.


ALLISON R. LAWSHE D.D.S.
TRENTON NEW JERSEY
JAMES M. MAGEE D.D.S.
ST. JOHN NEW BRUNSWICK
C. BUNTING COLSON M.D.D.D.S.
CHARLESTON S. CAROLINA
E. L. TOWNSEND D.D.S.
LOS ANGELES CALIFORNIA
WILL A. PRESSLEY D.D.S.
ROCK HILL S. CAROLINA

A Successful Method of Filling Fast Decaying Teeth of the Young and Anæmic, etc.

By C. BUNTING COLSON, D. D. S., Charleston, S. C.
Awarded the First Prize, Gold Medal.

It is my belief that we are on the eve of discovering a specific, which will prevent disintegration of the teeth of the young and of those in poor health, other than by the merely mechanical and prophylactic measures of to-day. Before explaining my own methods of procedure, I will discuss briefly some of the processes and materials which have given us particularly satisfactory results in the mouths of the young and anæmic, and especially of nursing mothers.

The most useful materials, here named in the order of their usefulness, have been soft gold, gutta-percha, tin, lead, cohesive gold, oxyphosphate of zinc and oxychloride of zinc. The various processes upon which we have depended have been fillings with one or more of the above materials; cleansing or polishing of the enamel; or completely surrounding the teeth with metal as with a band or crown, thus protecting them from the secretions of the mouth.

Therapeutically we have advocated prophylaxis by friction with the brush, silk, mouth lotions and dentifrices, and the cauterizing with nitrate of silver, of surfaces presenting superficial caries.

In which direction shall the dental student of the future seek for that specific which shall be to dentistry what Jenner, Pasteur, Koch, Roux and others have given to the general practitioners of medicine? Preventive dentistry may eventually rely upon a process; certainly not upon any particular filling material. It might be possible to permanently preserve human teeth if a method could be discovered by which we could electrically deposit gold, silver, nickel or platinum over all the surfaces of the teeth of the young, preventing by such deposit, caries in fissures, and the attacks of micro-organisms; but as we can scarcely hope for this, and as filling materials can only retard and partially prevent further progress of rapid decay, and as such disintegration is pathological, our future dependence must be upon therapeusis.

Therapeutic Properties of Filling Materials.

It has long been noted that pure soft gold apparently acts better than any other material used, in preventing subsequent disintegration of the teeth filled, even where the manipulation has been faulty. It is not uncommon to find a leaking or

loose gold filling of soft gold remaining in a tooth for years and preserving it, which would seem to prove that its action depends upon some therapeutic property, and is not due to perfect adaptation. This cannot be said of cohesive gold.

We have similar preservative properties in tin and lead, but it is not always wise to use these materials in the teeth of the young, because of the discoloration which they frequently cause. Copper amalgam has given good results under certain conditions, of which, however, as yet, we know too little to be able to utilize this material, which, the lack of knowledge as to when and where to use it, renders most unreliable.

We have fairly good results from gutta-percha as a temporary expedient, and here again we have an action which is apparently therapeutical rather than mechanical. When well manipulated, gutta-percha often serves a permanent purpose, and even when poorly placed frequently gives better results than could be obtained with any other material.

Therapeutics has furnished us with some good preparations for the prophylaxis of the mouth, but none are specific, and the mouth being an ever washed cavity, the effect of the most powerful agent is soon lost. In many mouths, the teeth are covered with a viscid, thick, clinging deposit, not very soluble and not easily removed, and which is not penetrated by any ordinary or even extraordinary germicide or antiseptic. Wash a child's mouth with the most potent of these agents yet known, and we will find under the felt-like pads an abundance of thread-like bacteria.

We have several mechanical processes which are valuable in combating the early stages of decay. When first detected, if we thoroughly cleanse the surface and polish the enamel with hardwood polishers, we are frequently able to abort the process of decay. We also have a reliable agent in nitrate of silver, especially for deciduous teeth, where it is of great advantage in retarding the progress of disintegration of the enamel, and, except that it leaves a coal black stain, it would be exceedingly valuable in dentistry.

I will now briefly describe my method of preserving rapidly decaying teeth in the mouths of patients between the ages of ten and twenty, and also in young mothers and anæmics. We find similar conditions in nearly all these cases, except that in children we have a larger pulp cavity and less dentine between the filling and the pulp.

Many years ago I became impressed with the idea that the enamel and dentine may be affected far beyond the point usually reached with our excavators. I was forced to this conclusion by observing the recurrence of decay around fillings and beneath them. I have frequently cut

away more tooth substance than is usual and obtained success, though I have occasionally lost a pulp from the proximity of the filling to that organ, even when care had been taken to line the cavity.

I have also found that in many of these cases, in the course of time, the vitality of the pulps became impaired, the pulps eventually dying. I therefore became convinced that it was not altogether the proximity of the cement lining, nor of the gold, which caused this, but rather the infected condition of the dentine between the filling and the pulp, and I have proven the correctness of this theory by obtaining good results through proper treatment prior to filling.

Having demonstrated to my own satisfaction that the dentine of the decayed teeth is affected more deeply than is usually believed, I became assured that soft gold would be the best material for preserving the teeth and preventing subsequent recurrences of decay.

Method of Preserving Rapidly Decaying Teeth.

My present method of filling rapidly decaying teeth is as follows: I demand sufficient space in which to work. If the cavities are in approximal surfaces, I open by cotton packing, cork and sometimes rubber, and then keep the teeth apart with a peg of wood until the soreness leaves. With the rubber dam adjusted, and the cavity well dried, I attack the enamel edges with a very sharp chisel or excavator, but prefer to use a small, fine cut fissure drill or bur.

I cut back the enamel well before I proceed to excavate the cavity. I excavate the dentine with sharp excavators, using only hand instruments, as they are better controlled, and, if sharp, less painful. After as thorough an excavation as judgment will permit, we are frequently compelled to leave a small pad of decay at the bottom of the cavity for fear of exposing the pulp. Believing that the apparently normal dentine and enamel are not as healthy as they seem, of course, it is not satisfactory to leave this pad of decay, which is composed of particles of broken down dentine, micro-organisms and other septic material absorbed from the saliva; nevertheless, we are forced to leave it. To fill over it with any material without first taking necessary precautions, would be fatal to the success of the permanent filling. It is the bacteria thus left within the cavity which destroys many teeth, however carefully lined and filled.

After excavating, my next step is to either dry out the cavity with warm air, and I frequently do this while excavating as it reduces pain to a minimum, which should be a slow stream of warm air, not hot, but just warm enough to drive back the serum and evaporate the contents of the tubuli to some extent. I then bathe the cavity with a drop of a solution of caustic soda, which is instantly sucked up by the dry tubuli.

The soda penetrates the tissues of the tooth to a considerable depth, neutralizing all the acid that may be present in the tooth itself, or in the pad of decay. Again, drying this out and applying warm air as before, I flood the cavity with oil of cloves. Why oil of cloves? I have tried nearly all the germicides that I felt justified in experimenting with, and I find that oil of cloves is the most suitable and efficient.

After absorbing out the surplus with bibulous paper, I again apply warm air. Oil of cloves has the peculiar property when heated to the point of volatility, of penetrating and will pass deeply into the tubuli, and so embalm the substance of the pad that no fermentative action can occur.

Special Treatment of Enamel Borders.

Now I return to the enamel border. Treatment of this margin is the most important of the entire process of filling this class of teeth. I employ some original instruments made of carborundum pencils ground down and pointed so that they resemble a well sharpened lead pencil. I have these of fine grit and placed in porte polishers. With these fine points I grind my enamel well around to the full extent of the diameter of the cavity that there shall be no overhang to any portion near the surface. I now trim the extreme outer edge of the enamel, surrounding the cavity to the outer bevel, or counter-sink, similar to what is made in flushing a screw head in cabinet work, but not at so acute an angle. All this is done with the small carborundum pencil points. Then I line the cavity with balsam, believing that I seal within the tubuli sufficient of the essential oil to prevent the development of any spore or of any fermentative decomposition in the pad. While the balsam is drying, I polish my beveled enamel border.

I desire to make a few remarks on polishing enamel, because the practice does not seem to be as generally appreciated as it was twenty years ago. It was formerly the common practice in the treatment of superficial decay, after removing the roughened surface, to polish the enamel carefully, and I have always been impressed with the ability of these fresh surfaces to resist the attacks of the agents of decay, which seem to prefer a roughened enamel surface.

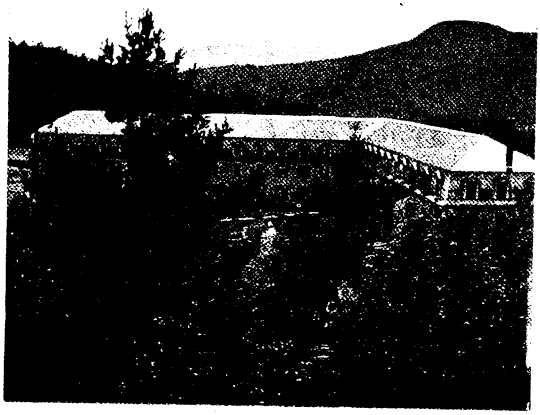
When we find decay to be general throughout a mouth, we invariably may note that the enamel surfaces are far from having that high polish which we see in a healthy mouth; therefore, I think it very essential to perfectly polish these enamel borders. I use for this purpose points of hardwood, mostly seasoned hickory and boxwood, sharpened like pencils, held in the porte polisher bits. Running my engine at a rapid speed, I polish the beveled enamel borders of my cavity until my

mouth mirror shows me that they shine and reflect light. This is not difficult nor painful, nor does it require much time, but it is very necessary to a perfect operation.

Bear in mind that I am writing of teeth in which we may expect a recurrence of decay. In such cases I ordinarily use a cement lining, especially in very young mouths, to avoid the necessity of placing gold in contact with the dentine, but this must be done with judgment and depends upon the depth of the cavity. If I use cement, I anchor in it several pellets of cohesive gold as a foundation, in preference to deep anchorages, but I do not fill the entire cavity with cohesive gold. When I have the cavity about two-thirds filled, I place around, as I work, little pellets of pure soft gold about No. 4, folded from four to six times. This I lay along the enamel borders and they are held in place by the cohesive gold as it is built over them, until I have all the enamel edges of the cavity overlaid by these soft gold pads beyond the bevel. I then complete the filling with cohesive gold and burnish thoroughly.

It may be asked, why not fill with soft gold entirely? The answer is that soft gold fillings to be well inserted require much pressure and much malleting. The enamel of the teeth of the young is not dense enough to resist such pressure. Again, I cannot finish to a certainty to the outer edge of the bevel of the enamel, with soft gold, and I also wish to restore the approximal relations of the teeth by contouring; nevertheless, I want soft gold on the beveled polished edges; covered by cohesive gold well burnished down, I have no fear of bacteria destroying the tooth so polished. A few children may not have the patience or endurance to submit to this method, though I rarely am obliged to adopt any other.

My next favorite filling is gutta-percha, and I prefer the common pink base plate gutta-percha to any of the white preparations, and I use it wherever I can, where its color does not make it objectionable. To fill teeth with gutta-percha, especially in the mouths of small children, is an art, and requires as expert a hand as any gold filling, and, although it can be done much more quickly, it is difficult. In the posterior teeth I always use it below the gum margin and almost invariably touch the bottom of the cavity, be it enamel, cementum or dentine, with a crystal of silver nitrate, and then insert the gutta-percha. In this manner I have saved teeth which, without the use of the silver nitrate, could not have been certainly preserved.



TWIN MOUNTAIN HOUSE

THE AMMONOOSUC DRIVE

A System of Removable Bridge Substitution, Using Sound Teeth, Cavities and Roots as Abutments.

By ALLISON R. LAWSHE, D. D. S., Trenton, N. J.
Awarded Second Prize—Gold Medal.*

The system here presented of making and adjusting a removable bridge between sound abutting teeth possesses a combination of merits which makes its use of value in nearly every part of the mouth, and which especially indicates it in the incisor and bicuspid regions of the upper jaw.

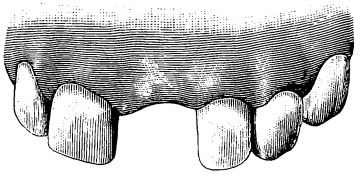


Fig. 1

Fig. 1 is a model made from a plaster impression, showing the left superior central incisor missing, and the teeth on either side of the space sound. Now the queries are: How can we supply an artificial substitute, in the nature of a bridge, which shall not require mutilation of the natural teeth to a harmful degree; which shall be removable for repair, and for wedging and filling the abutting and neighboring natural teeth; which shall be self-cleansing in its nature; which shall be sound and durable; which shall be non-irritating to the gums and surrounding tissues; which shall exhibit the least possible show of gold consistent with strength and durability?

To supply a fixture for Fig. 1 to fill the above requirements I selected a single-gum plate tooth of the proper shade, size and form to accurately match its fellow on the right side and to fill the space caused by the loss of the missing member. The sides of the right central and left lateral were then cut down slightly with sandpaper disks to reduce the diameters of the crowns just a trifle. Measurements were next taken of the teeth around their necks with binding wire and very close fitting bands made of 32 gauge coin gold, 20k. gold being used as a solder. These bands had a width of about 1-8 of an inch. They were next ground with a round-edged corundum stone in the engine until they

* Beautiful specimens of the author's work were submitted with his paper.—ED.

would conform nicely in form with the gum festoon, fitting neatly under it, and have a width on the labial surface of about 1-32 of in inch. This accomplished backings are made for the natural teeth, which are used as abutments, in the following manner, and a description of one will answer for both: Cut a piece of 32 gauge annealed platinum plate of the proper size and form and bend it to the right shape to come edge to edge with the palatal and approximal parts of the band, to extend to the cutting edge of the tooth, and to cover about one-half its approximal surfaces—in other words, to go far enough around to receive the contact of its neighbor on either side, although this is optional with the

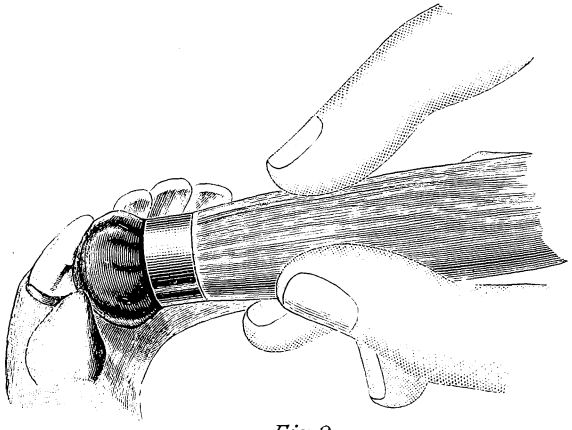


Fig. 2.

operator, the sides being left uncovered if preferred or thought advisable. The backing being thus made roughly is now cemented with hard wax in its proper position on the band, invested in soft plaster and marble-dust and united with 18k. gold solder. This done, adjust the band to the tooth where it belongs and swage the backing to the tooth by the use of a little bag of "mustard-seed" shot and a vulcanite scraper handle or similar instrument tapped with a hammer, as shown in Fig. 2. This quickly and beautifully makes a perfect fit of the soft platinum backing to the tooth's rough palatal surface. The approximal sides may easily be burnished with right and left gold burnishers.

The next step is to "back" the artificial tooth with gold or platinum, rivet the pins to hold the backing in place, and attach with hard wax to the backing between the middle and cutting edge of the tooth, and in a direction parallel to it, an arm of each of two small angular pieces of No. 20 gauge iridio-platinum wire having the form of a broad V. The arms of these angular wires are about one-eighth inch in length; the free ones, when in position, are about parallel with the long axis of the

tooth. Fig. 3 shows the wires in position after having been soldered and finished. Now from a piece of No. 31 or 32 gauge "crown gold" make two tubes, gold side out, one-eighth inch in length, over a piece of No. 20 wire, and after waxing the angular wires in position on the backing, adjust the previously made bands to the teeth in the mouth or on a plaster model made from a plaster impression, place the tubes on the posts, the tooth into the space where it is to go, and adjust the tubes, with the pins in them, until they take the least prominent position they can be allowed to take. This done, fasten the tubes to the backings of

Fig. 3.

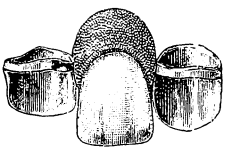


Fig. 4.

Fig. 6.

the natural teeth with a little wax. The "dummy" with its pins may now be carefully removed from the tubes, invested, and solder flowed over the whole of the backing, uniting it with the rivets and posts. Before investing the bands preparatory to soldering them to the tubes, the tubes should be carefully painted inside with a cream made of chalk and water to prevent the solder flowing inside and interfering with the insertion of the pins. The seams in the tubes are closed during this operation and the solder should be flowed well up the sides of the tubes for

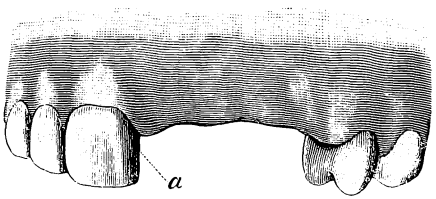


Fig. 5.

strength and support, and to make the finished case smooth to the tongue. I use 16k. solder here, but before flowing it I warm the platinum backings, coat them with hard wax flux, sprinkle 18k. solder fillings over them and melt. That makes them strong. Before waxing the tubes in place the lower ends should be bent shut so that they are nicely rounded by the subsequent operation of soldering and are thus made quite unobtrusive to the tongue. Fig. 6 shows a top view of the "central" band with the tube attached. I use "crown gold" in preference to

platinum for constructing the tubes because a low grade solder will unite with it more closely than with platinum, and I prefer it rather than pure gold on account of its being less liable to "burn" during soldering. Fig. 4 shows a front view of the fixture completed and ready for adjustment in the mouth.

Fig. 5 shows a case similar to Fig. 1 in which three teeth are missing instead of one. Here the same appliance is indicated with the difference only in the form of the bicuspid band, shown in Fig. 7. This band is made in all respects as an incisor or cuspid band, excepting that no backing is made for it, the band being left broad (3-16 to 1-4) in the back, and that 1-16 inch soft gold or platinum band is arched over the crown between the cusps and is burnished closely to the enamel. Fig. 8 shows a back view of the "dummies' with their posts. Fig. 9 illustrates a back view of the "dummies" and bands in position. Fig. 10 is a front view of the finished and adjusted bridge.

Fig. 7.

Fig. 8.

Fig. 9.

To adjust the fixture in the mouth place a roll of cotton under the lip, fill the mouth with a napkin to keep the tongue and all moisture from the teeth, wash the bands and abutting teeth with absolute alcohol and dry with hot air. Then paint the gum festoon sparingly with tinct-

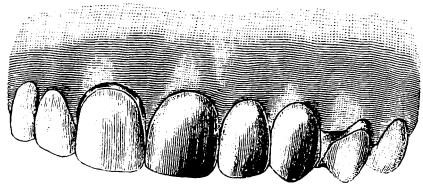


Fig. 10.

ure perchlorid of iron as a styptic, place one band on its tooth in the mouth as a guide, mix on a cold slab a reliable slow setting preparation of oxyphosphate of zinc cement to a creamy consistence, carefully coat the inside of the unadjusted band, as well as the neck of the tooth where it belongs, press to place and burnish all parts of the band and backing well into contact with the tooth. The automatic mallet will often be of great value in doing this work thoroughly. As soon as the band is burnished to its proper position adjust the artificial substitute into its place with the posts in the tubes, and if everything is as it should be take out the "dummy," remove the surplus cement and varnish with mastic and alco-

hol before moisture touches it. This being done remove the band used as guide, cement and burnish it to place and before the cement hardens again adjust the "dummy" in position to see if the band has taken the proper place. When the cement has hardened fill the tubes with hard wax, warm the posts, press the "dummy" to place, trim away the surplus wax, and the bridge is finished. In the lower jaw the wax may be dispensed with, if preferred, and the removal of the appliance left to the pleasure of the patient.

The sides of incisor and canine abutting teeth need not be ground straight with their necks, because, while the crowns of these teeth are broader than their necks, the necks are much thicker, anteroposteriorly, than the crowns, and thus the breadth of one is largely compensated for by the thickness of the other.

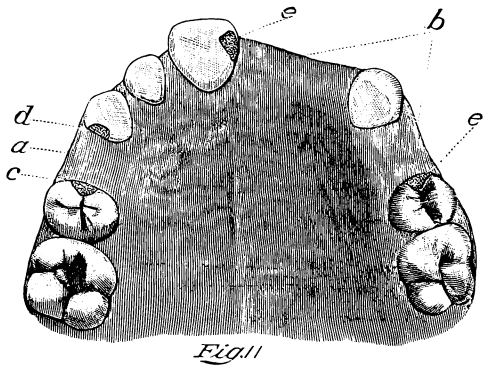


Fig. 11

In many cases more space may be gained for the tubes and their contained posts by cutting from the "dummies," the palatal approximal edges next the abutting teeth (*a* Fig. 8), and when necessary, which is seldom, from the edges next the "dummies" of the abutting teeth themselves (*a* Fig. 5).

In Fig. 11, *a*, shows a space caused by a missing first bicuspid, and *c* and *d* cavities in the teeth on either side to be used as anchorage for the bridge about to be described.

Fig. 12 represents two tubes about one-eighth of an inch in length, with pins attached for anchorage. They are made by bending annealed platinum or "crown gold" plate around No. 20 wire as previously described. The pins are soldered to them and the seams made tight in one operation, but before doing this the inside of the tubes should be filled with soft investment to prevent the solder filling them; and after the pins are attached the tubes should be warmed and coated with hard wax flux and 18k. solder filings sprinkled over them and melted to give

strength. If a number of these are made during spare moments it will often save the operator valuable time and his patients long sittings.

The first step to take, in the work upon the natural teeth, is to adjust the rubber-dam and prepare the cavities precisely as for the insertion of gold fillings; the next, to anchor the tubes into the cavities with oxyphosphate of zinc cement by pressing the pins into it, the tubes being left just outside the cavity about parallel with the long axis of the tooth in the position shown at *aa* in Fig. 13. While the cement is soft a few pelets of annealed gold foil may be pressed into it to assist anchoring the future gold fillings.

Fig. 14 is a back view of a porcelain faced bicuspid "dummy" made for the space *a*, Fig 11, in this manner: grind and "back" the facing,

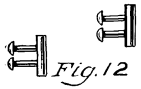


Fig. 12


Fig. 14


Fig. 15


Fig. 16

strike out and fill the cusps and wax both together in the usual way; then bend two quarter-inch pieces of No. 20 gauge platinous-gold or iridio-platinum wire to a right angle, warm them and force them into the wax until they present the apearance of Fig. 14. Now try it into the

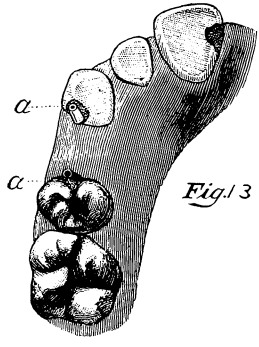


Fig. 13

space where it is to go by putting the posts into the tubes and gently forcing the tooth approximately to the place it should occupy when finished, observing whether the tubes are parallel with each other, as they should be, and if everything is satisfactory, carefully remove the "dummy" and lay it aside.

As soon as the cement is firm enough to be worked upon, the unnecessary portions may be trimmed away to form undercuts, the cavity

margins made clean and perfect fillings inserted with gold foil; the gold being packed solidly around the pins to prevent the possible chance of the pins loosening under the strain of mastication, and built half way up the sides of the tubes that no crevices may be left about them for food to collect.

The rubber dam may now be removed, the "dummy" again put into its place and the patient instructed to close his teeth in every manner possible that the operator may get a perfect articulation. This done, remove it, invest it, and replace the wax with solder.

To adjust the fixture in the mouth wipe out the tubes with absolute alcohol, dry with a hot canal instrument; with the same instrument melt hard wax into the tubes, warm the posts of the "dummy" and press it to place. Chill the wax with cold water, trim away the surplus and the bridge is finished.

Fig. 11, at *b*, illustrates a larger case than the preceding one. In this three teeth are used as supports by utilizing the cavities *ee*, and by banding the cuspid which stands alone. These cavities are treated in the same manner as those just described, and the band for the canine tooth as explained for incisor teeth excepting that two tubes are attached to it instead of one. Fig. 15 shows the artificial substitutes for this case.

Where we have a single space on either side of a sound incisor or bicuspid it is perhaps better to connect the "dummies" by passing a heavy iridio-platinum bar around the tooth which stands alone, instead of banding it.

The tubes, of course, can be soldered to full gold caps and porcelain faced crowns and thus the system is applicable to those frequent cases in which it is desirable to crown the teeth or roots to be used as abutments.

Sometimes bicuspid and molar masticatory can be used as anchorage by the use of a tube with its attached pin which together form a letter U. This pin is attached to the tube, near its open end (Fig. 16).

Where great strength is required, as in supplying molar teeth, it is best to anchor two tubes in one filling, or to one crown.

It is not necessary for me to enumerate the advantages of this system of using sound and caried teeth as abutments for removable bridge appliances. If it be possessed of any merits you can see them and there is no need for me to point them out.

LOWER FALLS OF THE AMMONOOSUC

UPPER FALLS OF THE AMMONOOSUC

A Perfect Filling for the Posterior Teeth.

By Dr. JAMES M. MAGEE, St. John, New Brunswick.
Awarded a Silver Medal.

That the insertion of a perfect filling is of paramount importance to the majority of dentists, no one will question. The perfect filling for all classes of cavities has not as yet been discovered. To be perfect, it should be easily manipulated, easily introduced, easily finished. It should be readily adapted to the unevenness of the cavity walls, and be the color of the tooth. It should be a poor conductor of heat and cold, and be insoluble so far as the fluids of the mouth are concerned. Furthermore, and not least of all, it should retain its shape under stress of mastication.

Except for color, amalgam combined with cement as a lining for the cavity, fulfils all of the above requirements. Therefore in parts of the mouth remote from view it is a perfect filling.

The best results are obtained by using freshly filed alloy, and almost any of the alloys on the market is good enough, provided it does not contain too much tin. In all deep cavities where some of the partially decalcified dentine is left, it is best to varnish before using the cement.

In all cases where a contour is necessary, if practicable I use the rubber dam, and always a matrix.

Successful Treatment for Compound Cavities in Molars.

Let us assume for illustration a large cavity in the approximal surface, involving the grinding surface of a molar and having the posterior cusps somewhat undermined and side walls frail. The method which I employ is as follows:

First prepare so much of the cavity as conveniently may be, for the removal of filthy deposits, and the easy application of the rubber dam. Adjust the dam on so many of the teeth as will permit easy access to the cavity, and dry the cavity thoroughly. Break down all the cervical wall removable with a flat stout instrument, using the adjacent tooth as a fulcrum. Often a cavity will really extend one-eighth of an inch or more nearer to the alveolar process than at first suspected. Break away all frail edges, file and if necessary sandpaper. The only use I make of the engine in very extensive cavities, is in following out sulci, and smoothing the cavity edges with sandpaper discs, after trimming. After the margins are prepared, remove the remainder of the carious structure, and varnish dentine. Fashion a piece of thin sheet steel, such

as may now be procured at the dental depots, to a contour of the lost portion of the tooth, with pliers, allowing it to extend a little higher than the tooth, and lay it aside.

Mix a little amalgam to a quite plastic lump and flatten somewhat. Mix cement to a thick creamy consistency and apply quickly, smearing it all over the cavity. Introduce the amalgam and quickly work it with ball burnishers and flat instruments till the cavity presents only a metallic lining. It makes very little difference how much cement remains under the amalgam, provided there is the merest film around the edges. With a sharp instrument thoroughly clear away the edges and fit in the matrix. Warm and pack a little gutta-percha around the matrix at the gum line to hold it firmly against the cervical margin. Mix fresh amalgam, and squeeze out all the mercury possible. Cut it up and pack with ball burnishers, using as much pressure as possible. Mercury will soon be worked to the surface. Remove this as often as it appears, and add fresh amalgam. As the filling progresses it will be found necessary to brace the ends of the matrix to keep them in place. Nothing will hold the ends quite so satisfactorily as the thumb and finger of the left hand. As pressure is made by the packing instrument, the natural resistance of the opposing fingers makes a perfect brace.

After the filling has been made somewhat higher than the tooth, carve the top of the filling until it is shortened about the height of the tooth. Remove the gutta-percha by sticking a heated instrument into it. Bend back the matrix ends, and if the amalgam has been properly packed, there need be no hesitation about grasping one end with pliers and pulling out sideways. Carve filling to perfect contour with the sharpest trimmers, and burnish tinfoil on to the filling to absorb the mercury, continuing until the tin will take up no more. Smooth the approximal surface by passing a waxed silk with pumice, or other polishing girt, between the teeth, and after making sure that no loose particle of the filling is left at the cervical border, remove the dam. Carve to a perfect articulation. Ten minutes polishing at a subsequent sitting, will make such a filling "a thing of beauty and a joy forever." It will defy caries.

Where the patient's time was limited, I have frequently been obliged to fill at a single sitting, cavities in the anterior and posterior surfaces of a molar, both of which required contouring. In such cases after the first is finished, I separate the other space with the Perry separator and insert the second filling. The only effect of the intense pressure on the first filling is a little brightening of the surface, due to mercury. One thickness of tinfoil absorbs all that appears. This is a test severe enough for any amalgam filling.

Should the cavity extend so far beneath the gum margin that it is impossible to carry the dam beyond its edge, prepare and smooth the margins, and fit a matrix, smoothing its sharp corners and edges. Slip it to place and apply the dam. Then proceed with gutta-percha to hold the matrix against the cervical edge, just as if the dam had been placed on first. The only difference in succeeding steps is that more care must be used in getting such a thin layer of cement at the cavity edges as gives the best results, and in removing every vestige of cement from the very edge.

Advantages of Cement Lining under Amalgam.

In ninety-five per cent. of amalgam fillings put in by me, I use a cavity lining of cement. The benefits of cement are fivefold: (1) it retains the filling; (2) it preserves the color of the tooth; (3) it prevents the metal from transmitting sensations of heat and cold to the pulp; (4) by its use we save valuable tooth structure, as owing to its adhesive properties we do not require so much cutting for anchorage; and (5) if caries should occur in any part of the tooth near the filling and should extend to the filling, it progresses less rapidly than if no cement had been used. Amalgam in contact with dentine in a live tooth discolors it, and by virtue of that very discoloration preserves it, but no one has yet seen the same happy effect follow the contact of amalgam with enamel. There may be a slight discoloration but there is also a slight disintegration and as a result the tooth is an easy prey to caries all along the border of the filling. I care not how near the cement may be to the edge, in fact I take pains to plaster cement all over the cavity, but I also take the precaution of removing every particle from the very edge, after packing my first layer of amalgam, so that when the filling is finished, there will be no cement to dissolve out.

In cases where the pulp has been removed, the support received from the cement is of the greatest benefit, because the longer a tooth is pulpless, the more brittle it becomes. Amalgam directly in contact with dentine in a pulpless tooth, does not discolor with the result of preserving it, as in the case of a live tooth, and if no cement is placed under it, disintegration takes place sooner or later.

Method of Securing Proper Space by Separation.

In cases where the teeth are firmly fixed, secure space by separating previously to the date set for filling if possible, otherwise great difficulty will be experienced in getting a proper contact with the adjacent tooth. In cases where the side walls are broken down it is always safe to secure space, but if the side walls are still standing and enough of the tooth remains to keep a correct contact between it and its neighbor, it is not necessary in young subjects to sepa-

rate. The pressure of amalgam against the matrix is sufficient to counterbalance the little space taken up by it between the teeth.

In my experience the most humane method of securing space is by the use of the Perry two-bar separators. I have no wish to advertise these articles for the sake of the dealers, but if a greater number of dentists realized the wonderful benefits following their use, their patients would receive the blessing, and they would receive the patient's thanks. I had one of these separators ten years before I had demonstrated to me the proper use of it. Immediately I bought the others of the set, and since that time have had endless satisfaction. Separation may be secured in many ways, but with the exception of the tedious process of filling the cavity with gutta-percha and allowing it to remain for some months, there is nothing will move the teeth apart so easily and painlessly, and do so little damage to the teeth and surrounding tissues as the Perry separators.

Many forms of matrices are used and all have their advocates who obtain good results, but for contouring the approximal aspect of a tooth, standing in correct relation with its neighbors, the only universally satisfactory matrix is one cut and fitted to the particular case in hand.

Pinless Teeth for Bridge Work.

By Dr. E. L. TOWNSEND, Los Angeles, Cal.
Awarded a Silver Medal.*

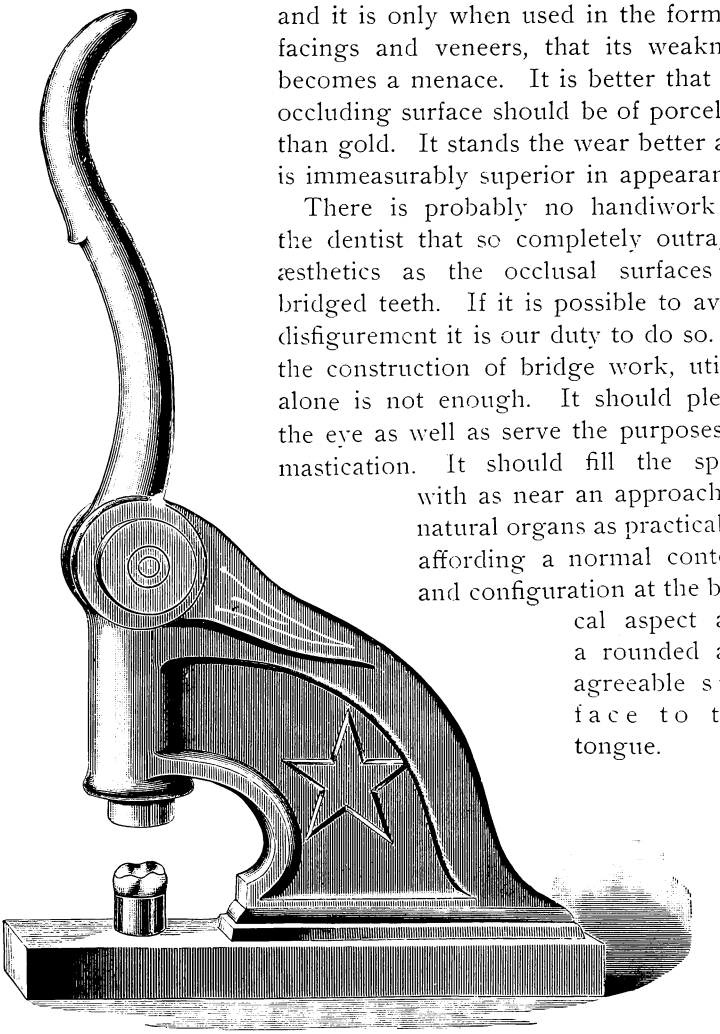
A bridge that properly fills the vacancy, presents an artistic appearance, is strong and durable, easily repaired without injury to any portion of the work, is something that commends itself. Such an appliance can be constructed, using pinless teeth cemented in position, and avoiding the necessity of heating the porcelain, thus eliminating a great source of danger and reducing the labor of construction. It is contemplated that the porcelain portions shall be interchangeable, and in the event of a break, easily replaced.

As these teeth are held in place by cement only, it is readily seen that the operation is in no wise a difficult one, and can be accomplished with little discomfort to the patient or operator. But it is not anticipated that there will be broken teeth to replace; and to those who have observed, it is well known that solid porcelain crowns like the Logan withstand the force of mastication for years, even when unprotected by bands.

* This paper was accompanied by a complete set of crowns and bridges, showing all stages of the work advocated. These were admirably constructed, and must have cost the author a great deal of time and labor.—EDITOR.

When properly shaped, porcelain seems to be equal to the requirements, and it is only when used in the form of facings and veneers, that its weakness becomes a menace. It is better that the occluding surface should be of porcelain than gold. It stands the wear better and is immeasurably superior in appearance.

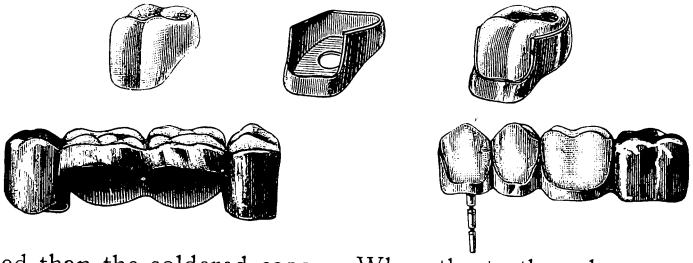
There is probably no handiwork of the dentist that so completely outrages æsthetics as the occlusal surfaces of bridged teeth. If it is possible to avoid disfigurement it is our duty to do so. In the construction of bridge work, utility alone is not enough. It should please the eye as well as serve the purposes of mastication. It should fill the space with as near an approach to natural organs as practicable, affording a normal contour and configuration at the buccal aspect and a rounded and agreeable surface to the tongue.



The teeth which occupy the positions of dummies in the bridge are constructed by stiching the gold band around a porcelain tooth, having approximately the size and shape of a natural tooth, and depending upon the adaptation of the band and cement for holding it in position. Believing that if the adaptation of a band to a root with the aid of cement will hold the completed appliance in position, that a tooth in place, it follows that there is no use to which it will be put that will loosen an individual tooth sooner than it will loosen the entire fixture.

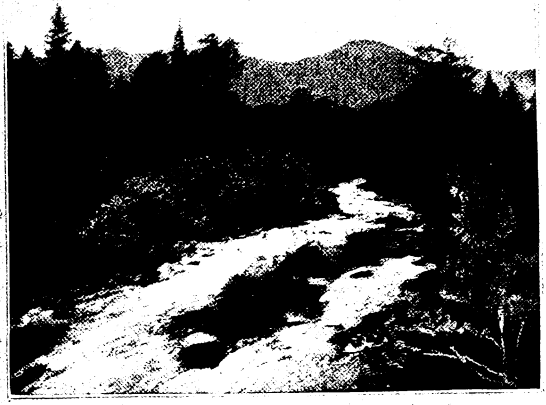
The dummy is made by forming a band somewhat smaller than the tooth and pressing the tooth into it, using a Notary Public seal press for this purpose, Fig. 1. The porcelain has strength enough to stretch the gold to conform to the contour of the tooth, thus insuring a perfect adaptation. The crown and band are now removed from the press, and the lingual portion of the band cut away to conform to the space intended between the bridge and alveolar ridge. The buccal portion of the band is trimmed to expose as much of the porcelain as possible. The porcelain is now removed and the bottom soldered on, after which the tooth is replaced and the dummy is ready for articulation.

This style of dummy may also be constructed by stamping out of sheet metal a cap, that shall correspond to, and fit the base of the porcelain tooth. This cap being of one piece of metal is more easily ma-



nipulated than the soldered caps. When the teeth and caps are made interchangeable, bridge work can be constructed that will be artistic, and within the reach of the average practitioner. A hope long deferred.

The abutments must conform to the conditions. If the attachment be to a living tooth, a shell crown should be used. If the anterior abutment be a pulpless tooth, then the problem is easily solved by using a Davis, How, English or an old style wooden pivot crown, fastening the pin in the root and adapting a band to root and crown, with a hole through the cap. This form of abutment allows the porcelain to be replaced without disturbing the attachment to the root. It is preferable to fasten the pin in the root, separate from the band. It allows a tapering screw to be used and there is no guess work about the attachment of pin and root, and in case of removal it is easier to unscrew the pin. The abutments being constructed, an impression is taken, model formed and dummies articulated, after which the porcelains are removed. The caps or shells are filled with investment material binding the whole together and the piece soldered from the bottom. Extend clasp-metal from abutment to abutment, in those cases requiring an extra amount of strength.



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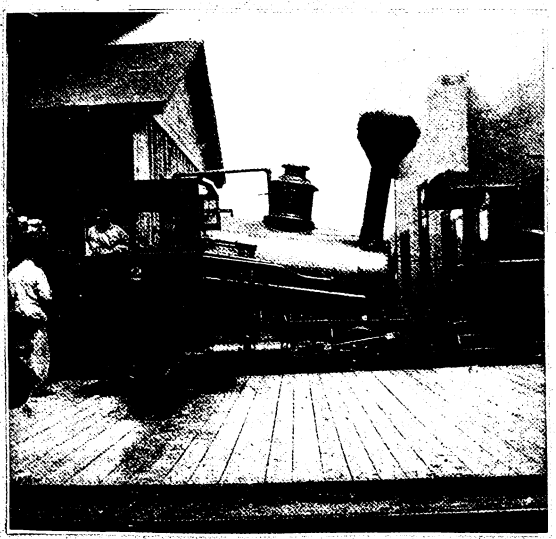

At the Summit Mount Washington

"Prophylaxis."

By WILL A. PRESLEY, Rock Hill, S. C.

Awarded a Silver Medal.

A small word, truly, but considered carefully, how great, how *very* great! What does it mean? The answer, as given by one of our most eminent authors, is, like the word itself, quite short, viz., "Preventive treatment." And yet, as a definition, nothing could be fuller.

Prophylaxis is the fundamental principle of all medical science—to correct a morbid condition is merely secondary. To prevent a morbid condition is certainly far more desirable than to have that condition established and to suffer the effects of it until therapeusis can come to the aid of the victim.

The Chinese have many curious customs. One which strikes me as a wise one is their method of engaging medical advisers. The physician receives a compensation so long as his patient remains well. Whenever he becomes sick the pay of the doctor is cut off, and where the patient is a royal personage, I believe it is the head of the physician which is cut off also.

Children's Teeth Improved by Treating the Mothers.

Children's teeth should naturally come first, though perhaps, to be truly prophylactic, we should go further back, and consider the attention to the mother's health and teeth during gestation. We breed fine horses, and other stock, by generations of careful attention, and why not be as ambitious for the human race? The development of the teeth is one of the most interesting processes of the body's growth. Beginning about the seventh week of fœtal life, it continues until the completion of calcification in the third molars. At the birth of the child we find the twenty teeth, making up the temporary set, at a rather advanced state of development; also, in their respective places, we find the germs of twenty-four of the permanent teeth, in various stages of development. For all these up to this stage, and until she ceases to directly feed the child, the mother is responsible, and the good, bad or indifferent state of health which she is in and the good, bad or indifferent attention which is given to her teeth and their nourishment in the food which she eats, determines, to a great extent, the quality of the infant's teeth. This is an axiom.

Consequently, to give our infant a fair start in life, prophylactic measures must be used in feeding to the mother, in every form which can

reasonably be given, foods which will furnish the proper nourishment for tooth and bone tissue, as well as those which will best nourish the blood, and, through it, the whole body. It is a true saying that "like seeks like"; thus, each tissue of the body will seek, in its development and repair, that element of the blood which is similar, or, rather akin, to its own structure. The food of the mother, then, during gestation and the nursing period, must contain an abundance of mineral constituents to meet the demand upon it—from herself—for repair; from the child, for formation; otherwise, healthy tissue cannot be formed; the teeth of the infant will be imperfectly organized, and consequently predisposed to decay. Looking at the question in this light, the mother must be fed upon those cereals which contain the essence of the whole grain (to digress slightly—would it not be a grand thing if the physicians and dentists of the country would unite in condemning the manufacture of "patent" flour?), and should be augmented by a generous allowance of milk Thus the little fellow is supposed to have—by prophylactic treatment of the mother—reached this stage, when he is cast away from the maternal fountain and is started to grinding his own mill, with a good set of teeth for his millstones.

Prophylactic Treatment after Weaning.

Prophylaxis would suggest, in the way of diet, a continuance of the same articles of food, which he now takes direct instead of by maternal agency. Having shown that the food is the most important consideration in the development of the child and its bony structure, and therefore the primary prophylactic, in that it furnishes the proper basis of formation for the organs whose perfection is necessary to health, I may claim that food is nourishing to the system only in proportion to the extent of its assimilation, and, that the little one now, as I said, ready to grind his own food, must keep his grinders in the perfect state in which his mother presented them. A proper offering to that sweet goddess, Hygeia, can only be made by prophylaxis. Unlike other portions of the human body, the teeth have no reparative power. Once their integrity is destroyed, so far as the mineral portions are concerned, there is no relief, except through mechanical means. Their lost tissue cannot be replaced by nature. Thus, we see that the chief consideration is prophylaxis. The province, then, of the dentist is to preserve the teeth.

Prophylaxis would suggest, beside the proper nourishment, an absolute cleanliness, both mechanical and chemical. From the beginning the child should be taught a regular and proper use of the brush; the use of floss and a harmless powder, which, without any injurious effects, is capable of producing the mechanical cleanliness; the proper employ-

ment of an antiseptic agent, in liquid form. These agents, properly used upon the perfect teeth, would, if thorough, exclude possibility of caries. I have occasionally seen men of sixty-five years or older with thirty-two perfect teeth in their mouths. Another writer has said that "50 per cent. of the decay of children's teeth is preventable." Can we not make it still higher than that? Through the imperfection of the treatment, however, we may suppose that there has been a failure to prevent a pathological condition. Still, a treatment for the purpose of preventing further encroachments and to prevent the severity of symptoms, would be a prophylactic effort and would further emphasize its primary importance. The removal of salivary or other deposits, for the prevention of injury to the soft parts; the excavation, treatment and filling of carious cavities, for the prevention of odontalgia; the removal of exciting causes, for the prevention of neuralgia, abscess and other troubles of that nature; the use of a saline, or an alterative, to correct systemic conditions, which aggravate neuralgic or inflammatory lesions; all these are peculiarly demonstrative of the value of prophylactic treatment.

It is peculiarly through the prophylactic treatment of the teeth and other parts of the oral cavity, that we hope, by a thorough understanding of the nature of the process thereof, and of the agents controlling them, to widen and extend the usefulness of dental science. The Dentist must rise to an appreciation of the fact that in prophylaxis he strikes the keynote, and that, when he has thoroughly mastered it, he has reached the climax of medical science.

LAKE OF THE CLOUDS.

The Roentgen Ray.

By Wm. James Morton, M. D., New York.

When I accepted an invitation to come to this meeting, it was with considerable lightness of heart, just as we all make promises very glibly, when the fulfillment is far in advance, and I little realized until the evening itself had arrived, what was expected of me; then I felt somewhat aghast, but with your kind forbearance, I will endeavor to fulfill my part of the programme, as well as possible, with the feeling and the reservation that I shall devote most of my time to the lantern slide exhibition, together with a few brief introductory remarks.

This marvelous achievement of modern times, the X-ray and its work, fell upon us all almost like a clap of thunder—not that we were unprepared for it, because, as often happens, several convergent streams in the past had been gradually forming their pathway down the stream of time, to merge into this wonderful result; and, perhaps, since there is so much that is practical to come, since there are slides to show, the fluoroscope to exhibit and pictures to throw on the screen, and since that part will perhaps appease your appetite for what is strictly practical, you will pardon me if I take five minutes in which to speak of these little convergent streams.

Evolution of the Roentgen Ray.

One of them started forty or fifty years ago—that of fluorescence and phosphorescence. By fluorescence, we mean that capacity exhibited by substances to emit light temporarily; by phosphorescence, we mean the capacity to emit light in a continuous manner. Forty or fifty years ago, a peasant in Bologna, while out walking, struck his foot against a piece of rock, which gave forth a bright light or glow, and which was afterward found to be fluor-spar; overcoming his superstitious awe, he carried it to a professor, who examined it and made experiments, and afterward named those powers of the rock fluorescence and phosphorescence. It was found that one substance after another possessed this capacity, and you will see later how this comes to bear on this subject. Decayed wood was found to be at times phosphorescent, and in modern times even so plain a thing as a lump of white sugar, exhibited to the sun's rays during the day, will at night emit a glow, and that same glow will penetrate opaque substances like wood and paper, and even produce pictures resembling the X-ray pictures.

That was one of the streams of human thought, but it was not perfected until it merged into another stream—the behavior of the electric current in a vacuum. In modern times, the capacity to suck the air out of sealed glass tubes, such as Dr. Van Woert will show you here, is so great, that all the air can be drawn out, with the exception of one-millionth part. German glass blowers found that they could draw the air out of glass tubes, with the exception of a very small part, and these German glass blowers constructed the Geisler tubes, which most of you have seen; but the Geisler tube was not a great exhaustion.

Then came Prof. Crookes, who was able to extract all the air in the tubes, except the one-millionth part, and he gave us the "Crookes" tubes. It is the agitation, or phenomena, that occurs in the vacuum of the tubes which produces the X-ray results. Crookes was so greatly struck by the features of what he had discovered, that he thought he had found a fourth state of matter. Everything we know is either liquid, or solid, or gaseous; but Crookes said things were finer and more attenuated than gas, even, and that in his tube he had but a few molecules of air, which shot and tumbled against each other in straight lines like bullets across space. He called the new condition radiant matter. He established all the phenomena except the X-ray, and it is astonishing to see how near a man can go to the border, without actually making the discovery. He did not discover that anything would go outside of his tube through space, forty or fifty feet, and take a photograph and affect fluorescent screens. It is a good deal like a romance to me.

Then came Hertz, and he investigated this matter and discovered that this velocity imparted to matter was so great that the matter itself penetrated thin sheets of metal within the tube. Then came Lenard, who, in his desire to find out what was going on in the tube, conceived the idea of putting a metal window in the glass, and this stream of electrical projection went through the little window, and so Lenard was the one who first led the X-ray outside of the Crookes tube.

Discovery of the Roentgen Ray.

Then came Prof. Röntgen, who, having all this knowledge back of him, almost in an accidental manner discovered the X-ray. One day, while working in his laboratory, and exciting the Crookes tube, having a piece of fluorescent material in the neighborhood, he noticed it glowed and emitted a certain amount of light. That awakened in him a new train of thought; he said: "If it will excite fluorescence through the glass tube, it must be in the nature of a powerful radiation that goes out of this tube. Perhaps it will affect the bromide of silver on a photographic plate;" he tried it, and, to his great astonishment, he found he had a shadow of a silver coin, or anything that

he placed on the plate. The radiation did not affect the area covered by the silver coin, but went through other things; so he had what was really a shadow of the object. Then he put his hand on a new plate, and he found that the bones of his hand intercepted the rays more than the flesh of his hand, and he had a shadow picture of the bones of his hand.

The news came to America, and we did not believe it; but it became more than a newspaper story, and the details of the discovery came over in a more definite manner, and we went on investigating and experimenting. I found myself fully equipped, because I had been experimenting in this way for some time; but I did not have the Crookes tubes. Only a few professors in the colleges had them. It occurred to me to use a radiometer bulb, and this I used with success, adapting my own electrodes to the outside of it.

That was the way it was born, and the X-ray child has held its grasp on the world and on the curiosity of the public ever since. It still retains the name of the "X"-ray—X representing the algebraic symbol of the unknown quantity. It has excited new thoughts as to the nature of matter.

Having gone into this brief exposition of the growth of the X-ray to its present position as still an unknown quantity, it remains to point out to you something as to its nature, and as to its source, and then devote our attention to its practical application.

The nature of the X-ray leads us into a great deal of confusion, if we pursue the course of thought too intently; but we must always do the best we can to solve these problems, waiting for the future to bring further developments.

The X-Ray Described and Explained.

The X-ray is produced in a vacuum tube, which is a sealed glass receptacle from which the air has been exhausted and into which, at either end, the wires enter. We must have a cathode from which issues the negative stream, and an anode, from which issues the positive. The intervening space is vacuum. What occurs is undoubtedly an agitation of something that is in the vacuum. We are thrown straight in among all those hypothetical agitations of the ether. The human ear, as you well know, is simply an organ which has arrived at a condition, by evolution, where it recognizes certain wave lengths or breaking up or agitation of the air. At a rate of vibration of 16 per second we will begin to hear a musical note, and above 40,000 per second, we will hear no sound. Still, no doubt, musical notes are made below 16 per second and above 40,000 per second. A little gnat makes a vibration of 40,000 per second, and we hear it; another gnat comes

along and makes a vibration of 60,000 per second, and we do not hear it. When light comes down ninety-two or ninety-three millions of miles from the sun and goes through the processes of reflection, refraction, etc., it has traveled that distance, but it cannot travel unless it has something to travel on and in. It is by the aid of the ether that it gets here, and the reason is because the ether is set into a given rate of vibration—from four hundred to eight hundred trillion times per second for light. Light, heat, chemical affinity and electricity, we know have vibrations of different frequency per second in the ether.

The nature of the X-ray is doubtless of the nature of light and heat and chemical affinity and electricity. It is undoubtedly a vibration in the ether. If we accept that, and it is probably the best explanation of the phenomena, we will be obliged to rest. It seems a little odd to say

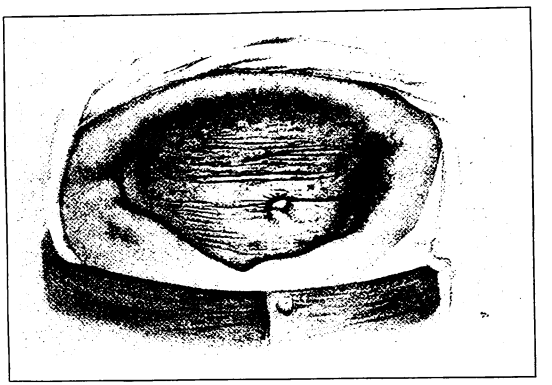

FIG. 1

that electricity is a vibration of ether, but such is the modern view. The electricity which takes a telegram from here to Boston, is nothing but the vibrations of the ether transmitted along, which as they pass along are better enabled to pass where the wire is, and that is why the wire is called a conductor.

I do not know that I need say more about the X-ray; I would rather conclude what I have said about the abstract and scientific portion of the subject, by calling your attention to the charming inferences you may draw from this conception of the X-ray as one of the forms of ether vibration. Just as in sound we do not hear certain notes below sixteen per second, so in light we do not see below about four hundred trillion times per second, nor above eight hundred trillion times per second; but there are vibrations above and below that rate. We know that electricity will vibrate in shorter wave lengths, even down to a yard.

There is still left in the universe to be sought for, a great number of ether vibrations, and each one of them I believe in the future is to constitute some new discovery. Electricity, heat, light and the X-ray are practically known to us as given rates of vibration; but the exact rate of the X-ray is not known at present. We have had shown to us recently wonderful telegraphy at a distance, without wires and without conductors, through walls and even hills. I allude to the Marconi system. That is another vibration in the ether, and a sensitive vibrator eight miles away has picked up the vibration.

I was asked to-day what I thought would be the next great discovery: I think it will be the differentiation of these phenomena produced by different rates of vibration of the ether.

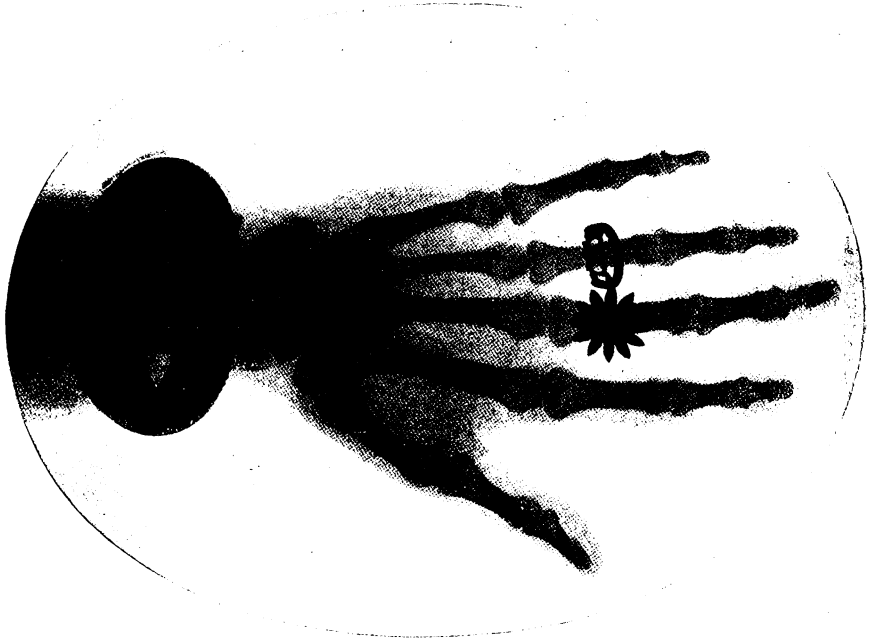

FIG. 2

So we may merge gradually from these known vibrations into other rates of vibration, and so we go from materialistic thoughts and results into that psychological region whose rates of vibration still remain unknown, always tempting us on to further discoveries; and in that realm of mind reading and mind telegraphy and all that train of things that appeals to our religious sense and to our mystic sense of the unknown, all may turn out to be rates of ether vibration. (Here the X-ray apparatus was exhibited at work.)

The X-ray would seem to be produced by the aid mainly of the cathodic, or negative, stream which causes an agitation of the ether with a rate of vibration akin to the rate of vibration of light. After the current stops working, you will see that phosphorescence of the glass still remains.

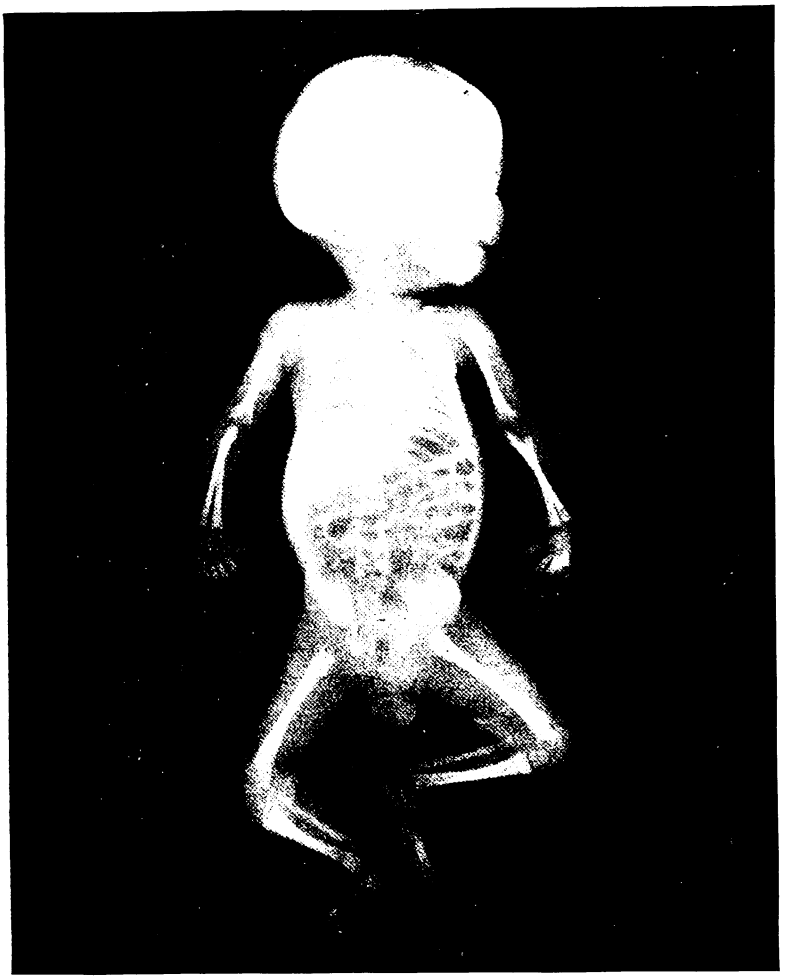

FIG. 3

The lantern slides are really a poor way of showing the X-ray pictures, or skiagraphs, but it is the only way to make them visible to a large audience. The negatives are much better to study details from.

(Prof. Morton showed a great number of pictures on the screen, among them the following):

Referring to this slide, Fig. 1, I must mention that after a few months it turned out that people were reporting that they had been badly burned by the X-rays. I saw in Boston a young lady whose abdomen had been burned, and I thought it would be well to show on the screen a picture of this kind. People in the laboratories often put their hands in front of the plate and some time afterward, the skin peels off and a raw surface is presented. It does not appear at once, but only shows nine or ten days later, and it takes quite a long time to heal. Regarding each molecule of flesh as a given unit of vitality, it seems as though the X-ray vitiated or destroyed it. It seems to destroy vitality of

FIG. 4

protoplasm. In all of the extensive pictures I have had occasion to take I did not notice a burn or injury to a patient, and for a long time I could not understand why people were getting these terrible accidents. Some people are suffering to-day at the end of six months from these burns. The trouble is that operators have put the X-ray too close to the flesh, within one, two or six inches, or they have a weak ray and make too long an exposure. I have always had a powerful X-ray, and have worked two or three feet and recently four and one-half feet away, and I attribute to that the fact that I have had no trouble.

I said the X-ray was not refracted or reflected, but it does suffer from diffusion. Take a person with heavy hips, and there is so much muscle or tissue there, that it acts on the X-ray like a fog on a search-light. The flesh acts as a turbid medium and causes a certain amount of loss in the X-ray definition.

Fig. 2. Picture of hand with a ring containing four diamonds. Had the stones been paste, they would have shown black, but the diamonds being pervious to the X-ray, have shown white. All sorts of carbon permit the X-ray to pass through them, whereas ordinary things, like iron, zinc and lead obstruct the rays. The other ring was full of rhinestones. An ordinary observer might have thought they were all diamonds, but the X-ray shows they were not.

Fig. 3. Picture of a child of two months, showing stomach distended with gas.

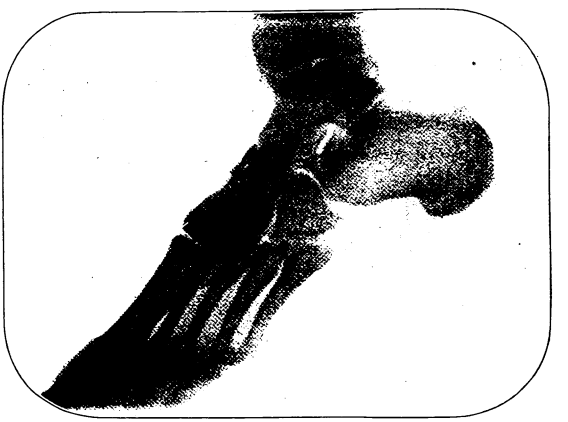

FIG. 5

Fig. 4. Picture of boy's foot in a shoe.

Fig. 5. Fine picture of a foot.

Dr. F. T. Van Woert then gave a practical demonstration of the X-ray, using a powerful static machine and a great variety of the more recent styles of Crookes tubes.

Cure of Acute and Chronic Alveolar Abscess.

By M. L. RHEIN, D. D. S., New York.

Alveolar abscess is generally divided into two forms—acute and chronic.

Acute alveolar abscess is understood to be the initial attack of this disease, which, when followed by later attacks in the same socket, become chronic in their form.

In the vast majority of cases, the abscess is the result of a dead pulp which has been invaded by pathogenic germs, and although there is some percentage of cases which are the result of traumatism and infection from other sources, they are met with so infrequently that this paper will be strictly confined to those cases caused by dead pulps.

Etiology of Alveolar Abscess.

The pulp in a tooth may be dead for many years, but as long as it is not invaded by some form of bacteria, no purulent condition will ensue. A dead pulp, whether it has been in this condition twenty-four hours or twenty-four years, becomes a pabulum for the first germ that may reach it, and its degeneration into a condition of purulency, with the consequent development of mephitic gases, is very rapid.

The result of the pressure of these gases, and the general septic condition existing, at once causes a severe inflammatory derangement in the alveolar region, starting from the outer portion of the end of the root. The force of this current of pus surcharged with mephitic gases is very great, and generally six or seven days are required for it to find its way through the outer plate of the alveolar socket, and thus gain an exit.

When we consider that the patient must endure from five to ten days of the most intense pain before the accumulated pus is evacuated, it is evident that something should be done to alleviate these sufferings. The inadequate method of using heat and poultices to shorten the period of suppuration, is not only reprehensible, but it is questionable whether the pointing of any abscess has ever been hastened one hour by any form of poultice.

There exists to-day two methods of caring for patients presenting themselves in this unfortunate condition: One is, if possible, when the case is presented early enough, to abort the attack entirely; the other, when it is evident that the first method of treatment would be useless, to resort to surgical means at once, and enter the septic zone of tissue.

Abortive Treatment of Alveolar Abscess.

It is within our power more frequently than many would imagine to absolutely prevent an attack of alveolar abscess, even after pus has commenced to form.

The first step to be taken, where an incipient alveolar abscess is suspected, is to adjust the rubber dam over the affected tooth, and drill an opening into the pulp chamber, on a line that will enable the operator to approach as directly as possible, the ends of the roots. Never utilize for this purpose a cavity already existing in some other portion of the tooth, as it is most essential that no mechanical impediments should interfere with the thorough cleansing of the root-canals. For the same reason, the opening should never be small, but always large enough to afford an unobstructed view of the root-canals. It is far safer to remove a large quantity of healthy tooth-structure, which can be restored by suitable filling material, than to be compelled to operate in root-canals, entirely by the sense of touch. The opening of the canals themselves should be more or less enlarged by the use of suitable drills. The contents of the canals should then be thoroughly removed, and by the careful performance of this portion of the operation, is determined, in a great majority, the successful abortion of the threatened attack, or the cure of the disease, if it already exists.

It is not best to rely upon any particular method of removing pulp tissue. The judgment of the operator should guide him in the choice of a method for each individual case. Where there is no doubt that the roots are absolutely straight, there is no danger in using a drill, similar to the Morey drill. This should, however, never be attempted in multi-rooted teeth, nor where there is any mechanical obstacle preventing direct access to the end of the canal.

By means of drills, broaches and bristles, having removed as much of the pulp tissue as possible, we may place our dependence upon chemical agents for removing the remainder of the pulp debris. For this purpose, two excellent agents have been introduced within the last few years: The one first brought to our notice by Dr. Schreyer, of Vienna, is a combination of metallic potassium and sodium; another method which accomplishes the same result, the destruction of soft tissue at or near the end of the root-canal, is a 50 per cent. solution of sulphuric acid. For this suggestion we are indebted to Dr. Callahan.

Use of the Potassium-Sodium Preparation.

The Schreyer paste which, after a little experience, will be found to be the more satisfactory of the two, in appearance may be likened to a soft and freshly prepared amalgam, and is kept protected from the atmosphere by a layer of paraffin. It is used in the following manner: A partially worn out Donaldson nerve

cleanser is plunged through the paraffin into the potassium and sodium, and upon withdrawal will have a slight quantity of the chemical compound attached to it. This is then carefully introduced into the various root-canals, repeating the operation until the bristle has reached the very end of each canal. Upon the introduction of the potassium and sodium into a pus contaminated canal, considerable heat is generated, and by chemical action, a saponification of all the organic matter in situ ensues. This subsequently is carefully washed out with a solution of bichloride of mercury in hydrogen peroxide, 1 to 500, introduced by means of a hypodermic syringe.

Application of the Schreyer paste is sometimes followed by some slight discomfort to the patient, and if some purulent matter has already escaped through the end of the root into the apical space, the pain will be more intense, and will be still more increased by the action of the hydrogen peroxide when it comes in contact with any septic matter on the outside of the root. The pain evolved from the powerful injection of this germicide is the only objection that can be claimed against this method of treatment, but it certainly seems far more preferable to inflict a few moments' suffering of this nature and produce a subsequent condition of absolute health, rather than to use palliative measures which so frequently hold the organic matter in a lethargic state, ready to be awakened into renewed septic activity at some subsequent period.

In case there is any good reason to believe that pus may have already formed beyond the end of the root, this treatment is supplemented at the same sitting by electrolysis, passing to the end of this moistened root, a chemically pure wire of zinc, attached to the positive pole, the negative pole being applied to some other portion of the body.

The result of this electrolysis, pursued according to the suggestion of Dr. W. J. Morton, is the evolvement of oxychloride of zinc, which at once makes its way through the end of the root, and in its nascent condition, will destroy all pathogenic germs, and arouse a vital energy which will restore healthy reaction.

The canal is then lightly packed with dental floss, dipped in Ceylon oil of cinnamon, if it is a posterior tooth, and the oil of myrtle, if it should be one of the anterior teeth. This is covered with a soft stopping of gutta-percha, and the patient dismissed for a couple of weeks, with the consciousness that the alveolar abscess has been aborted.

Regardless of the time required, this method should be thoroughly followed as soon as possible, if success is to be expected.

Upon the return of the patient, reporting complete comfort and rest in the interval, the rubber having been adjusted, as it invariably should be in every dental operation, the dressing is removed and the

cavity once again carefully washed out with the solution of bichloride of mercury in peroxide of hydrogen, which will now cause neither annoyance nor pain.

Sterilization of Dentine by Electrolysis.

Having dried out the canal, the end of the root is then sealed with a solution of chloroform and gutta-percha, in order that, by means of electrolysis, the entire remaining portion of the dentine may be made thoroughly antiseptic. For this purpose the cataphoric apparatus is again brought into use, and some favorite germicide forced by cataphoric means through the tubuli of the dentine. The same solution of bichloride and peroxygen of hydrogen may be used for this purpose, or a simple aqueous solution of pyrozone, such as is used in bleaching teeth, or even the zinc wire, as above described.

Too much credit cannot be given to Dr. W. J. Morton for introducing this valuable and hitherto unknown means of antisepticizing the contents of the interior of the dentinal tubuli. Its value as a prophylactic agent in keeping the tooth immune from septic attacks is beyond all measure.

Surgical Treatment of Alveolar Abscess.

Where the infiltration of pus has extended to such a depth that it is impossible to abort the abscess, it becomes necessary to resort to surgical interference. Having selected a point on the outside of the gum opposite the end of the root, the gum having been anæsthetized by a cataphoric application of cocaine, a trephine in the engine, rapidly makes an opening through the alveolar plate to the affected tissues.

This opening may be made large, or left small in size, according as, in the opinion of the operator, the gravity of the case may require. In performing this operation, strict attention should be paid to absolute aseptic principles. Thus, by surgical means, the suppurating tissues are removed, saving the patient several days of agony and much loss of general vitality. Where an artificial sinus is thus established, it does not necessarily follow that the relief from suffering will be immediate, although, as a rule, only a short time will elapse before immunity from pain results.

In these cases the treatment of the interior of the teeth is the same as when the effort is made to abort the abscess, with the single exception that the bichloride of mercury in hydrogen peroxide is forced through the apical foramen into the artificial fistula, and out at the external opening which has been made.

This fluid, as it comes in contact with the pus, will cause more or less pain, and its exit through the gums can be readily determined by

lifting up the rubber dam and noticing the froth-like exudation from the entrance to the fistula.

After having thoroughly washed out this tract with this powerful germicide, it is then wise to insert, to the very end of the root-canal, a piece of chemically pure zinc wire, and by cataphoric means, force the electrolytically evolved oxychloride of zinc into the adjacent tissue. Beware of over treatment in these cases! This one application, if properly made, ought to suffice for the ultimate cure, of an acute attack of alveolar abscess.

At the same sitting, the canal having been thoroughly dried, the end of the root should be hermetically sealed with chloro-percha, and the interior of the dentine rendered antiseptic by cataphoric measures, as suggested by Dr. Morton. The remainder of the canal should then be dressed with Ceylon cinnamon oil, covered with soft gutta-percha, and the tooth allowed to rest in this condition until the external orifice shall have entirely closed.

The treatment of the external opening varies according to the gravity of the case. Where it is small, no further attention need be paid to it, than that the patient should be instructed to use a proper antiseptic mouth wash frequently, during every twenty-four hours, holding it in the mouth at least five minutes at each time, in order to avoid any possible infection at this point. It might also be gently syringed out for a few days with some germicide by the operator, for the same reason. The only care requisite is to avoid infection of this tract.

Where, however, on account of the increased extent of the affected zone, a large opening is made, it will be found advisable to leave a small drainage tube in the tract for a few days. This should be daily removed and cleansed, and the tract syringed with some proper antiseptic solution. Around the drainage tube should be kept packed a small quantity of antiseptic gauze. After the drainage tube has been removed, it will still be necessary to keep the opening filled with a gradually decreasing amount of this gauze, for a length of time, depending upon the rapidity of the formation of new, healthy tissue.

In reference to gauze of this nature, my choice has been to use either iodoform or nosophen gauze, the latter being entirely devoid of the unpleasant odor of the iodoform, and containing about four times as much iodine in the same amount of bulk.

Abscesses Caused by Capping Pulps.

While discussing this form of alveolar abscess, it might be well to devote a moment's attention to the number of alveolar abscesses that are occasioned by attempting to conserve pulps, either exposed or diseased. The so-called conservative treatment of

exposed pulps of the teeth of adults, is not practiced as extensively as it was some years ago. The majority of observing practitioners have learned to modify their practice in this respect, though very few of them have had the courage to present to the profession the results of their modified course of treatment.

When, for any cause, in an adult, the pulp of a tooth becomes exposed, there is absolutely nothing lost in the removal of the same, except the time consumed in this portion of the operation. The attempt, however, to conserve the life of this organ, means that the patient undergoes the continual risk of pulp inflammation and death of the organ at a place, perhaps, distant from his dentist, or at a time inopportune for any dental operation; even though at the time when this unfortunate result takes place, the dentist is easily accessible, purulent invasion of the tissue has already taken place and caused a certain amount of destruction, not only of local vitality, but also undermined, to a greater or less extent, the constitutional vitality of the patient.

Abscesses on Sound Teeth

While speaking of the removal of pulps not entirely dead, for the prophylactic treatment of alveolar abscess, our attention must not be diverted from another class of cases, which require this treatment, in which frequently no external point of caries, nor break in the enamel has ever occurred.

We find a large percentage of such cases in persons suffering from pyorrhea alveolaris. The pulps in these teeth do not die rapidly, but there is generally a slow and gradual cessation of vitality, due to the lack of nutritive substance, or, in some cases, of the extraordinary irritation produced by frequent attacks.

It has been a long standing rule with me, in the treatment of severe cases of pyorrhea alveolaris, to diagnose as carefully as possible the amount of vitality in the pulps of the individual teeth which are badly affected. This is accomplished by using the rubber dam over each of such teeth in turn, and testing the same by means of either intense cold or heat. In the majority of these cases, illumination with electric light is of very little value.

As soon as one of these teeth shows an appreciable lack of response to intense cold, it has become my practice to enter the pulp-chamber and thoroughly remove the contents of the root-canal, treating according to the conditions found.

A large number of such cases, if operated upon at the right time, will show the pulps to be devoid of any vitality up to within a very short distance of the ends of the roots. The result of leaving such pulp tissue for a longer period of time is the eventual loss of life of the remaining small

portion of the pulp, followed almost invariably by an alveolar abscess which, unfortunately, in many cases, is never suspected as it frequently opens into the pyorrhea pockets which are present in such mouths, instead of burrowing through the alveolar plates, the common result in acute alveolar abscess in normal teeth.

There is also another class in this category, where the life of the pulp at its entrance into the tooth is destroyed, while some vitality remains in the canal proper. The removal of the pulps of such teeth is not only essential to the proper treatment of the existing pyorrhea, but is generally preventive of subsequent attacks of alveolar abscess.

All traces of the diseased condition, resulting from an acute abscess having been obliterated, the rubber dam is again adjusted over the tooth, the essential oil dressing removed, the canal thoroughly dried—sometimes washed out with a powerful solution of pyrozone, and then filled two-thirds of its length with a cone of gutta-percha. This should be packed as solidly as possible by means of a probe wound with cotton and dipped in chloroform. Over the gutta-percha should be placed a filling of oxyphosphate of zinc, leaving sufficient space for a permanent covering of gold.

Summarizing the treatment of the acute stage of alveolar abscess, I repeat what I said on a previous occasion, "that it means nothing more nor less than the complete obliteration of the diseased zone of tissue, leaving to nature the absorption of the coagulated material, and at the same time avoiding overtreatment, the danger of which consists in leaving the tissue so indurated that it cannot possibly be absorbed; consequently, a chronic abscess, due to mechanical causes, is frequently the result."

Chronic Alveolar Abscess.

By this term may be understood a pathological condition existing for some period of at least more than thirty days, and involving, either continuously during all this time, or at periodic intervals, the infiltration of some portion of the alveolar process of the maxilla with purulent matter. It may either have a direct outlet through the alveolar plate, or may be confined in a sack in the apical region of the alveolar portion of the maxilla, commonly known as a cold or blind abscess.

The first essential in a case of this nature is to make an accurate diagnosis. By this is meant so thorough an examination of the gum, roots and all the adjacent parts, by means of probes, electric light, touch, etc., that a very clear knowledge is obtained of the pathological conditions, from an anatomical standpoint.

Having a thorough knowledge of the conditions, the first step is to adjust the rubber dam and remove the contents of the root-canals to their very end, irrespective of whether they contain pulp tissue, filling material, or broken instruments, all of which conditions are liable to be met, either singly or combined. Never allow a prior filling in such a tooth, however good its condition may appear to be, to interfere with the thorough exploration of the canal to its very end. Only too frequently will be found a diseased area of tissue in a minute space, at the very end of an excellently inserted root filling.

Chronic Alveolar Abscess without Fistula.

The contents of the root-canals having been thoroughly removed by mechanical and chemical means, the treatment varies according to the conditions that present themselves. Where the abscess is one known as of the blind variety, consisting of a sack attached to the outer periphery of the end of the root, the best results will be attained by enlarging the apical end of the root by means of a very small Morey drill, which is deliberately run, if possible, into the sack contents. The cavity is then syringed out with an aqueous solution of pyrozone, and the cataphoric use of electrolytic oxychloride of zinc, applied to the end of the root, if possible, tapering the zinc wire so that it will protrude through the apical foramen, hoping in this way to destroy the entire contents of the sack by means of the escharotic action of the nascent oxychloride of zinc. The electric current should be continued for from ten to fifteen minutes' time, in order that the entire zone of diseased tissue may be effaced.

The canal should then be sealed with a dressing of cinnamon oil, as previously outlined, and the patient dismissed for a couple of weeks, when, in the judgment of the operator, if a cure has been effected, the end of the root may be sealed and the interior of the root sterilized by cataphoric means, and subsequently filled with gutta-percha.

There is always more or less doubt in these cases as to the absolute destruction of this diseased tissue, and no great error can be made if a second, or even a third application of the oxychloride of zinc should be made. Even then, if the outer periphery of the root has become necrosed, the cure will not be radical, but at some later period in life, will re-develop in the form of an acute attack of alveolar abscess, so that the prognosis in all forms of blind abscess, where no artificial sinus is made, is not altogether a favorable one; consequently, wherever it has appeared that the outer periphery of the root itself has become necrosed, it will be no mistake to perform the original operation of amputating the end of the root, as about to be described for the cure of those cases where a sinus already exists. In case such an operation is performed, the out-

side of the gum can be anæsthetized by cataphoric application of cocaine, and the opening made in the same manner as described in the portion relating to acute alveolar abscess.

Chronic Alveolar Abscess with Fistula.

In the majority of these cases of alveolar abscess there is present a well marked sinus, opening through the alveolar plate of the maxilla, and emptying purulent matter into the mouth through the gums. In accordance with the length of time that this condition has existed, is dependent the extent of the necrosis of the tissue adjoining the root by the infiltration of this purulent matter.

In all these cases there will be found more or less necrosis of the outer periphery of the end of the root, as well as all that portion of the alveolar plate that is washed by the pus. As long as this necrotic tissue is allowed to remain in situ, it will be impossible to effect a permanent cure. Surgical interference is logical, and the only resource at our command in these cases.

A tooth of this kind, as in all other forms of alveolar abscess, must first be protected by the rubber dam, and the contents of the root-canals thoroughly removed, as previously outlined; the end of the root can then be syringed with the bichloride of mercury dissolved in hydrogen peroxide, followed by the electrolytic use of zinc as previously advised. This is done in order to secure as beneficial a result in the apical space as can be accomplished by therapeutic agency. The end of the root is then sealed with a chloro-percha dressing, and the root-canal thoroughly sterilized by the cataphoric use of a powerful solution of pyrozone; it is then at once filled with a solid cone of gutta-percha covered by oxyphosphate of zinc.

Our work with the interior of the tooth ceases at this point, but the cure of the pathological condition existing in the diseased tract, will never be accomplished until every vestige of necrosed bone and root has been removed.

The greatest criticism that can be passed upon us as a profession, in treating diseased conditions of this nature, is that by reason of the minute character of the daily work in which we are engaged, when we come to operate upon diseased tissue we have a strong inclination to err by being too conservative in the scope of our operative interference.

If we desire to cure chronic alveolar abscess, we must throw aside all that delicacy of touch which is our daily pride in ordinary dental operations. In order that there may be no question of having left behind any diseased tissue, we must follow the example of the general surgeon and enter freely into the zone of healthy bone and tooth-structure.

Amputation of the Apex of Diseased Root.

The incisions should be made sufficiently large so that by sharp burs in the dental engine we may readily remove a proper proportion of the bone in the diseased tract. In all these cases the most efficient method is to take the ordinary fissure-drill in the dental engine (the sinus having been enlarged by trephines or otherwise), pass it down the tract along the side of the diseased root low enough toward the crown of the tooth to be certain that you have passed into the healthy tissue, and there, by means of the drill, amputate that portion of the root which is necrosed.

In some cases this operation is surprisingly easy, while in others it will be found more or less difficult. No matter what obstacles may have to be surmounted, if the tooth is one to be preserved in a healthy condition, this will be found to be the only safe method. In many cases it will be necessary to place the patient under the influence of a general anæsthetic, especially where it is necessary to bur away the diseased portion of the alveolar process, in order that the end of the amputated root may be removed.

A common mistake of dentists is to look upon this operation as something beyond their scope, and to fear the treading on what they might term dangerous surgical ground.

It would surprise many who are unacquainted with this operation to discover how simple it becomes after they have amputated the ends of a few roots. No one is better prepared to perform such an operation than a good dentist, and in no place are there such facilities for performing the operation as are found in a properly equipped dental office.

In many cases of multi-rooted teeth, the amputation of the entire root affected by the disease is often to be preferred to the risk of leaving behind some necrosed tooth-substance. In such cases, the end of the stump can be nicely smoothed and hermetically closed with an amalgam filling, which at a later period should be polished as thoroughly as possible.

In pyorrhea alveolaris complex of all kinds, we meet with a large number of molars where the destruction of tissue has proceeded to such an extent that one of the roots has become entirely denuded clear to its end. This is especially true of the palatal roots of superior molars. In many cases, the pyorrheal condition has for a long time been complicated with alveolar abscess. To remove the palatal root of such a tooth has become so frequent an occurrence with me that it is difficult to keep an accurate recollection of the cases, and it is consequently with a deep sense of gratification that I am enabled to report that I have yet to see the

first case where the operation has not succeeded in permanently tightening these very loose teeth.

After the roots of such teeth are filled, the removal of such a palatal root is wonderfully simple. The parts are all exposed, and it takes but a few revolutions of the bur to amputate close to the crown, filling the end of the stump with amalgam, and later polishing the same.

Summarizing the treatment of chronic alveolar abscess, the contents of the root-canal should first be thoroughly and aseptically removed, and by means of cataphoric medication the apical space sterilized and the end of the root hermetically sealed. The dentinal tubuli should then be completely saturated with some germicidal agent, to be followed by the filling of the root-canal; all this preferably done at the first sitting. The remaining portion of the diseased tissue should then be entirely eradicated by surgical interference through an opening in the gum over the root, and if this has been effectively acomplished, there will be no question as to the radical cure of the abscess.

Discussion.

Dr. Allen, Newburgh.

With me, peroxide of hydrogen has practically supplanted all other germicides. It is so destructive of pus and of all worn out and broken down tissue that it eliminates possibly more than it destroys. I am very much interested in what Dr. Rhein has said about cataphoric treatment. I am aware that Dr. Morton, some eighteen months ago, suggested the application of a point of zinc wire into a sinus or fistula, claiming that such introduction, with the use of the electric current, brought on by electrolysis the formation of chloride of zinc. There is no better authority than Dr. Morton, but it has always seemed to me very strange that there could be enough chlorine in the decomposed tissue and serum to cause the formation of chloride of zinc as the result of the electrolysis. I would like a few words from Dr. Morton in explanation.

Dr. Ottolengui.

I will call upon Dr. Morton to explain how it is that any chlorine is set at liberty at all, and I would like him also to tell us something about the new electrodes which he has stated are preferable to those of zinc.

Dr. Wm. Jas. Morton, New York.

I am greatly pleased at having listened to a paper as scientific and thorough as this one. I have been struck continuously in my attendance at dental meetings with the extreme modern thorough surgical work that is being done about the mouth. Surgeons do not begin to be as thorough, and yet conservative at the same time as dentists. Since we are in Yankeeland, I will ask a question first before answering those asked me, and that is, in what position does Dr. Allen suppose the zinc to be in—soft tissue or dentine?

Dr. Allen. In the soft tissue.

Dr. Morton.

In the soft tissue, the answer is very easily given. In dentine a shade of thought should be given to the subject. In the soft tissue, any one can make the experiment by taking a piece of beef and a copper, silver, iron or zinc needle; sink the needle into the meat, attach the wire to the needle, and, as soon as the electricity begins to flow, the meat decomposes.

Oxy-Chlorides Formed by Electrolysis.

I often say that a human being can practically be considered to be about a 2 per cent. solution of common salt, from an electrical point of view. As a matter of fact, the brain tissue is about .012. Our saline constituents are mainly chloride of sodium. Our muscles are about .013, the gray matter has more salt than the white, and the blood has a little more than muscles; .006 will maintain the vitality in a muscle or nerve fiber, after it has been removed from the body. This zinc will decompose the fluids, as I said before; you will have a double salt. The question is, is there enough? What is enough for one thing might be a great deal too much for another. If you put the needle into the arm, as I have often done, and watch the process, you will see a white area extend over the skin. When it comes to the question of dentine, the dentine itself is rich in saline constituents, and furnishes sufficient chloride of sodium in solution to make the oxychloride. Any fluid of the body is practically a saline fluid. Whether that fluid exists in the dentinal tubuli, or the other parts of the body, it is practically the same thing. If in any case one thought there was not enough, he could use a tubular needle, and, putting it on the end of a hyperdermic syringe, inject two or three drops of a saline fluid in the region to be treated.

Electro-Medication with Soluble Electrodes.

Iron, copper, zinc and silver are what may be called soluble metals; at the positive pole, in contact with the saline fluid they decompose the fluid. The oxychloride of iron gives a greenish-blackish stain. The oxychloride of copper is quite bland; it permeates the tissues very easily, and is readily absorbed and carried away,

and in time produces a sort of counter-irritant, but does not destroy tissue. The oxychloride of zinc is a powerful escharotic, and one must be careful not to form too much. In my surgical operations, I go partly by experience and am partly guided by a milliampere meter. The latest idea is to use a silver wire tube or spatula, of whatever form you please. You make your own medicine on the spot, and with the aid of the electricity, at the proper moment the medicine is forced into the tissue. You cannot imagine a more ideal way of infusing an escharotic into a confined area, as the apical region about a tooth, where no drill could follow a tortuous canal, than by forcing these medicines in by the electric method. I think the greatest progress that is being made in dentistry, is this broad attention to all the modern methods; this treatment of such a little thing as a tooth, with as much care as if it were a patient.

Dr. Rhein. I would like to make a little clearer the application of the zinc or other metallic point, especially in root-canals. The point that impresses me in regard to the diffusion of antiseptic agents through the dentinal tubuli, is that it gives us the greatest means for perpetually saving a pulpless tooth, that has ever been placed before us. It makes no difference, with the old method, how carefully we treated the tooth; when we told the patient the tooth was all right, there was still danger of the organic matter in the tubuli becoming infected at a later period. We know how small a focus of infected matter is necessary to produce a violent attack of alveolar abscess; consequently, I place an enormous value upon what seems such a simple suggestion to any one making use of the cataphoric agency.

Electro-Sterilization. The method which I have adopted is as follows: After the end of the tooth has been sealed, if I want to use chloride of zinc, I first fill my canal with a solution of pyrozone, and add to that a small amount of chloride of sodium; then I place the zinc wire in this moistened canal, and there is absolutely no necessity for adding any more solution afterward, because the canal is thoroughly moistened.

Dr. Geran. I would like to speak of Dr. Callahan's method, or what induced him to use sulphuric acid. It was not the fact that he wished to sterilize the tooth so much as to enlarge the canal, in order to fill the pulp cavities thoroughly.

Dr. Van Woert. Dr. Callahan used it with a view of sterilizing the roots. In making use of that method he found that he could enlarge the canals, and that was the point he brought out at Asbury Park. He did not bring out the point originally; first, he made his investigations in the line of sterilizing the canals, and then he learned that he could enlarge them, and so reported.

Dr. Geran. I did not so understand it from Dr. Callahan. He always found it very difficult, as we all do, to get to the apex of the root, and it occurred to him that by introducing the acid and decomposing the internal structure of the dentine, he could get there more readily with broaches made for that purpose.

Dr. Rhein. While I agree with Dr. Allen that the hydrogen peroxide will destroy any present pus, its power ceases there; it has no escharotic properties that are not very superficial, and we require for this purpose something that will be more effective upon tissue that has not become purulent.

Sulphuric Acid. Personally, I place very little value upon sulphuric acid. The only use I find for it in canals, is in those cases where the root-canal is absolutely dry, but yet so impervious to a bristle that we cannot penetrate it, and it requires hours of persistent work to get through such a canal. The use of sulphuric acid in a canal that is simply filled with pulp tissue, is attended with many unpleasant things, the unnecessary destruction of tooth structure, and the penetration of the tissues, which I consider far more dangerous than the combination of potassium and sodium.

Dr. Schreyer's Method. There is nothing so effective in getting to the end of a root and so limited in its irritative properties as the wonderful combination of potassium and sodium. I would like to take this opportunity to correct an error committed by me a year ago, as to the use made of it by the originator, Dr. Schreyer, of Vienna. In reading a transcript of his monograph on this subject, in German, I misunderstood the language of the author, and supposed that he only pierced the pulp tissue with the potassium and sodium, and did not thoroughly remove the contents of the canal, and I made public in a discussion of root-canal treatment my objection to his using or abusing this wonderful therapeutic agent in this way, while giving him great credit for what he had done. I wish to state now that I did Dr. Schreyer a great injustice; I misconstrued his writings on this subject, and I have since learned that his practice is virtually the same as that alluded to in my paper, in that he thoroughly removes every portion of the canal contents before sealing the root of the tooth.

Dr. Allen. It seems to me that Dr. Rhein is not entirely consistent. I suggested that he used too many medicaments, that peroxide of hydrogen would be sufficient in the case described. Dr. Rhein says that the hydrogen dioxide does not answer his purpose, because it is not sufficiently escharotic; then he condemns sulphuric acid, claiming it is dangerous when going

through the apical portion of the root, because it is such a powerful escharotic.

Dr. Rhein. There is a happy medium in all things. It is sometimes necessary where the surrounding tissue becomes diseased, to remove that diseased tissue. If we are to rely upon therapeutic measures, we must depend upon an escharotic. However, there are different forms of escharotics; some are self-limiting and some more destructive; some leave an eschar that Nature tolerates and may even be followed by a healthy reaction. Of such a nature is chloride of zinc. I know of no escharotic that will destroy so much surface, and yet when it has reached its limit of destruction, will cause such a magnificent reaction and restoration to health. On the contrary, sulphuric acid does not so act. It invariably produces a slough. I have used sulphuric acid for many years, following the teaching of Dr. Atkinson, entering and following sinuses to the end in abscessed roots. One of his methods was to tampon a small opening with a pledget of cotton, dipped in aromatic sulphuric acid. I have used that method for many years, and I have noted how differently Nature acts with sulphuric acid than with chloride of zinc.

Dr. Wiksell. Will you tell us why you use one oil in the multi-rooted teeth and another in the single rooted.

Dr. Rhein. Merely because the Ceylon cinnamon oil has a tendency to stain. Although the stain is very light, it is liable to affect the color of an anterior tooth, and for that reason I do not use it there. It is a temporary dressing, and I believe it has a therapeutic effect that we do not get from any of the other essential oils. It appears to be much more soothing to the irritated surfaces in the apical space, but it is a risky preparation to use in anterior teeth, as I have noticed a great many discolorations.

Dr. Morton. I will corroborate what Dr. Rhein has said about the difference between the kinds of escharotics. I have had a great deal of experience, and it makes the greatest difference in the world whether you use sulphuric acid or chloride of zinc, and if it makes a difference in general surgery, it certainly does in dentistry. Sulphuric acid eats away the part, and that is the end of it; chloride of zinc spreads out, and later you get a healthy reaction. It destroys a great deal, but, at the same time, it leaves a capacity in the tissue for reaction. It seems to be a semi-escharotic. This is an important distinction, which ought to be kept in view.

Cataphoresis.

By F. T. VAN WOERT, M. D. S., Brooklyn.

To produce insensibility by the diffusion of medicaments with the electric current, we must have a galvanic current, or a direct flowing current. The question of next importance is the source of that current.

The Street Current Dangerous.

In the beginning of my investigations I became convinced that the use of the street current is dangerous. Rather than assume the responsibility of giving this opinion to the world as emanating solely from myself, I addressed a letter to several prominent men throughout the country, purposely excepting Prof. Morton, because I understood that he held different views, and I knew the time would come when we would meet and he could answer these letters publicly. The letters I have to corroborate my statement, have been withheld from the public, with the exception of a few paragraphs that were given to the New York State Dental Society in May. The others have been reserved for this meeting, to give Dr. Morton an opportunity to defend his position and point out the errors of the gentlemen who have written these letters. One other reason for believing that the street current is not advisable is the fact that I cannot see, from my clinical experience, the necessity for a high potential current, and that being the case, I have felt that it would be better to use batteries than the current supplied by the companies for electric lighting purposes. The following is a copy of the letter sent by me to the gentlemen whose replies follow:

Brooklyn, N. Y., January 26, 1897.

Dear Sir: The use of the galvanic current for the introduction of medicaments, better known as cataphoric medication, has become an established method in dental science. And as the members of our profession are unfamiliar with electricity, it is necessary that we appeal to those versed in the matter, for the solution of several problems, the most important of which is the source of current to be used. Taking into consideration the very high resistance of tooth-substance, would it not be very much more advisable to use the current generated by batteries, than the hundred and ten volt current used for electrical lighting? Would not the resistance of the person being operated upon cause the fuse wires to stand a very much higher pressure than was intended, thus making it dangerous? Again, very many dentists have fountain spittoons, which are made of brass and plated. The rubber tubing connecting them with the supply and waste pipes are stiffened and strength-

ened by heavy brass spring wire, thus making a complete ground connection. If a person were to place his hand upon the metal part of the spittoon, with the street current applied to the tooth, having been reduced to, say, ten volts through a rheostat, would there not be great danger of serious results, particularly when the location of the office is in close proximity to trolley lines, or underground conduits? Would you care to have the application made to your teeth, under such circumstances. Anything you can give us towards the solution of this will be greatly appreciated by the entire profession, as it will be incorporated in an article now in preparation for the Items of Interest, a Dental Journal, with a circulation of over ten thousand copies per month. Personally, I have taken a decided stand against the street current, for Dental Cataphoresis, but as I have nothing at heart but the advancement of our science, I seek the truth and would be glad to credit you with anything you may feel disposed to give us toward that end.

Trusting you will pardon the liberty I have taken of encroaching upon your valuable time, and hoping you will find it convenient to favor me with a reply, I am, very respectfully yours,

F. T. Van Woert.

Dear Sir: In reply to your favor of the 6th inst., I beg to state that I consider the use of street current very dangerous, and I would by all means use a battery. Yours truly, Thos. A. Edison.

My Dear Sir: It seems to me that, under the conditions you describe, a patient might eventually be injured, especially in the proximity of trolley lines.

Without wishing in any way to influence your course, I desire to say, merely in the interest of the profession, that I am about to put on the market some instruments which transform the ordinary street current, direct or alternating, into high frequency currents in an economical manner. This high frequency current may be regulated at will as to voltage and strength, and that kind of instrument might just be suitable for such purposes as you refer to. Believe me to be, yours very truly,

Nicola Tesla.

My Dear Doctor: I have no hesitation in saying that in my judgment you are quite right in the position you take. I do not think it safe or proper to make applications of electrical energy to the teeth of a patient from the street lines. Who can tell what voltage may suddenly be applied to the street lines by accidental contacts with arc circuits, or trolley circuits? If such contact were to be made just at the moment of application, the result to the patient might be not only "unpleasant" but fatal.

But supposing no accident of the kind just mentioned to occur, it is still quite possible to sometimes annoy the patient needlessly. It is no doubt true that the rheostat may be so handled that the same current will be applied as would be applied by the use of a local battery of the proper voltage. But if the circuit is for an instant broken, say, at one of the electrodes by which it is applied, the voltage at once becomes equal to that which the machine can furnish, or, in other words, the potential

difference between the electrode and the patient is as great as the machine can make. If now contact be renewed the result will not be pleasant.

The matters you mention respecting the fittings about the spittoon are so evident that there is no room for doubt that you are right.

I should advise, by all means, a separate battery.

Very truly yours, C. F. Brackett,
(Professor at Princeton University.)

Dear Sir: Without attempting to correct or explain several misapprehensions as to electric action under which you seem to labor, which would require an essay, I would say that I should consider the use of the one hundred volt current in the manner indicated as far from safe, and would strongly advise the use of what are known as the Mesco or other Dry Batteries. These cost but 25 cents a cell, last in ordinary use about one year, and give no trouble whatever.

The dry cells can be bought of any dealer in electrical supplies.

Yours truly, Henry Morton,
(Prof. at Stevens Institute of Technology.)

Dear Sir: We beg to say that in our opinion, any one who uses the street current does so at his own risk. This risk varies according to circumstances from practically nothing to a risk of considerable gravity, and in order to express an intelligent opinion all the circumstances peculiar to the case would have to be taken into consideration.

Very truly yours, Houston and Kennelly.
(Philadelphia.)

Dear Sir: We should certainly recommend the battery current as safer than the street current for the purpose you describe. A ground connection might be somewhat of an element of danger, but the potential of one hundred and ten volts is rather too low to be really dangerous under ordinary conditions. It could give a very bad shock, however.

Faithfully yours, Munn & Co.
(Scientific American.)

Dear Sir: Where overhead lines exist in a city it is extremely dangerous to use street currents in therapeutics, owing to the danger of the crossing of electric arc light, trolley and alternating current circuits with the circuits in use. A safe plan would be to charge a few cells of storage battery, depending upon the voltage which it is desired to use, by inserting in series with the batteries and street current, sufficient resistance to cut down the voltage to the desired amount. After the battery has been charged it may then be disconnected from the street mains and used for any purpose desired without the least danger. Another method would be to use a rotary transformer in which the windings on the armature were entirely distinct so that a street current of one hundred and ten volts could be reduced to any voltage required. The high resistance of enamel on teeth and tooth construction would not tend to increase the danger of using a given voltage. Of course, where there is any likelihood of a patient coming in contact with a ground through any

metallic connection, the danger is enhanced should the circuit have a ground in another locality. Street currents may be made entirely harmless by the method above outlined by the use of rotary transformers, or storage batteries, and we believe this is the only safe way to employ them.

The subject is one which has been thoroughly agitated and was discussed before the Boston meeting of the American Electro-Therapeutic Association, and also the meeting at New York of the National Society of Electro-Therapeutists, held during the week of September 29 and 30 last. The reports of these meetings will be found in The Electrical World of October 10, 1896, and further information may be obtained by corresponding with the secretaries of the societies, Dr. Max Einhorn, New York City, being secretary of the former, and Dr. William R. King, Washington, D. C., secretary of the latter.

We do not care to have you make mention of the source of the above information. (From the Editor of a prominent Electrical Magazine.)

Dear Sir: With reference to the relative advantages of using the current generated by battery cells and that derived from electric lighting circuits, I may say that so far as the physiological and chemical effects are concerned, the current is the same, provided you have in both cases the same number of amperes passing through the circuit, and as the volume of current, or the amperes, are governed entirely by the ratio between electromotive force and resistance, you can readily see that one could obtain the same result, or the same amperes of current, in any given circuit, whether the initial source of current were a lighting circuit or a series of battery cells. There is no intrinsic property of the current of a battery cell that makes it preferable to the current derived from a lighting circuit.

With reference to the liability of ground through fountain spittoons, or through the brass spring wire used for stiffening the rubber tubing, I cannot say what are the contingent chances of accidental ground connections through these appliances. I can say, however, that in my judgment, the proximity of the office to the trolley lines or the generating station would be a matter of little or no consequence. So far as the trolley lines themselves are concerned, they could not possibly be a source of danger, unless the trolley line itself was in contact with the aforesaid spittoon, or brass spiral spring, because the use of the earth as a return circuit by the trolley companies, makes them ground one pole of the dynamo anyway, and the current that you have read about as causing the destruction of gas mains and water pipes is one which, as a matter of fact, has a difference of potential usually of one or two volts, and certainly less than five; so that even if we were to assume the said brass spring, or spittoon, to make connection such as comparable to that of a water pipe connected to a gas pipe, or any other shunt connection between the rails, and the return conductors leading to the dynamo, the physiological effects and chemical effects of the current diverted through said shunt connection, would not be any greater than what could be produced with two or three Le Clanche cells.

With regard to the question whether I would care to have the application made to my teeth, under such circumstances, I may say frankly that, provided the rheostat were all right and could be depended upon to reduce the working pressure down to the required limit, I do not see that there would be any difference between that method of supplying and utilizing electricity for dental purposes and the method of individual or distinct supply from local battery cells. Yours very truly,

C. O. Mailloux.

(Electrical Engineer.)

Dear Doctor: I think that the street current of the Edison Company, one hundred and ten volts, can be used with proper adapters for the purpose mentioned. At the same time, I think I should hesitate to advise it unless the adapters employed were thoroughly understood and properly made. I do not use the street current about the head at all, although there are adapters that I think make it perfectly safe to do so. My advice would be to employ for dental purposes one of the portable dry cell galvanic batteries. Of course, the one hundred and ten volt current might be made perfectly safe, but one could never be sure in a large city that the wires might not somewhere cross the deadly alternating current wires, perhaps several miles away from the physician's office, and the fuses employed for safety might possibly be out of order. The dry cell battery is the simplest solution of the problem.

Very truly yours, Frederick Peterson, M. D.

From these letters I feel that I was not far astray as to the danger of the street current; but, even admitting that there are no dangers, I fail to see the necessity for it, inasmuch as the amount of potential required in dental cataphoresis is so small.

There is some diversity of opinion as to the amount of current required for perfect anæsthesia. I have not seen the case where I needed more than from three to ten Mesco cells, which have a voltage of about one and one-third volts each. I cannot see the philosophy of using one hundred and ten volts, and having a large rheostat when it would not be used.

An Electrical Phenomenon in Cataphoresis.

In my experiments upon tooth-structure, I find a condition of things which is contrary to electrical law; and yet I cannot help but believe it is true. The negative pole is the liquifying, and the positive the solidifying. When a galvanic current passes through the nervous matter in the tubuli, if the potential is higher than that matter will take, the result is a solidifying contraction to an extent which increases the resistance quite considerably. If the patient feels pain, and the potential is reduced until pain is absent, in many cases the milliampere meter will immediately show a higher rating or more current flowing, because of the absence of this contraction or coagula-

tion. This I have proven in many cases, and a number of gentlemen in New York and Brooklyn have had the same experience, and corroborate it. I qualify this by stating that it is contrary to electrical law, because in electrical law it takes a given amount of voltage to carry a given amount of current through a given amount of resistance. This is a phenomenon, and does not come under that head. According to electrical law, by reducing potential we reduce the ampereage. The resistance in these teeth was changed by coagulation or contraction, and by reducing the potential you reduced that, and, in turn, increased the flow of current.

Importance of Proper Electrodes.

In producing insensibility of the teeth in cataphoresis, I find that one of the most important factors is the method of applying the electrodes. I found in the beginning that all the electrodes on the market were devised to be held in the hand of the operator. All who have had experience know how irksome it is to stand with an electrode and keep it in position from ten to forty minutes to insure direct contact. I asked Mr. Wheeler, who devised the Wheeler Fractional Volt Selector, to devise an electrode which had a spring to slip over the rubber dam clamp, and a cord connected with that, the patient to hold the negative electrode. He did so, and it worked very satisfactorily, but a little experience taught me that there was another mistake, and that was in the negative electrode held in the hand of the patient, particularly in operating upon children. After the positive was fixed in position, the current turned on and the operation started, in many cases the children would carelessly drop the contact with the negative electrode in the palm of the hand, and hold it by the fingers, the sponge being free; then, remembering, they would grab it suddenly, and so receive a shock. I tried to get something in the form of a negative electrode, which would be a fixture wherever placed. This wrist electrode was devised, but it is nothing new. These things are not inventions of mine, but modifications of what has been on the market for many years. It is simply substituting the slide, which is part of the rubber dam clamp, and instead of the sponge, blotting paper was put on to make it clean, so that it could be taken off for each operation. That was very satisfactory, and was used by me for a long time. Later I became convinced that if I could shorten the distance between the positive and the negative, I could save time and produce the same results. I had an electrode made, the shoe of which is of German silver wire, passing into a hard rubber butt, the other covered with hard rubber, and the connection at that end. I found that I got my results in much less time and with less current, and from the introduction of

that I began decreasing the potential, until now I rarely use over three or four cells.

Perfect Diffusion of Current Requisite.

Another thing in producing perfect results is the proper diffusion of the current. In many of my first cases I found great difficulty in producing complete anæsthesia of the entire area. For instance, in a large crown and approximal cavity I would find the surface directly under the current would be cataphorized, and other portions would not be affected at all. In the mouths of two or three patients where I had difficulty of this kind, I placed over the cotton a layer of pure tinfoil, and putting the point of my electrode on and using the current in the same way, I got perfect results in less time.

Another great consideration is the imperfect damming of the tooth—bicuspid teeth in particular. The bifurcation of the roots extends to the neck in many cases. Electricity will seek the easiest path out always, and that is the point of least resistance. Therefore, it is necessary for perfect results, to see that the tooth is so insulated and free from any possible outlet other than the channel in which you want it to go, that the current is compelled to follow the direction desired.

Cataphoresis Dangerous to Living Pulps.

I believe that those dentists who are using a high potential will have a batch of dead pulps on their hands in the near future. You may ask why I think so. If those who have small incandescent mouth lamps will place a lamp behind a tooth in a darkened room before beginning an operation, and notice the passage of the light through it, comparing with adjacent teeth, and then after you have produced complete anæsthesia, place lamp there again, you will see exactly the same condition that you would get in a dead tooth—viz., an opacity. I first thought this due to the cocaine. Later I experimented to see whether that was so, and in many cases I got nearly the same result without cocaine. The discoloration was not so dense, but it was present and very marked. We will admit, for the sake of argument, that we may have failure with a low potential. Is it not better to have a few failures? Suppose you have a young lady on whose front teeth you are operating, and the tooth turns black? A young lady, the daughter of a prominent man in Brooklyn, was sent to me nearly a year ago. In operating for her I first discovered this danger. I was treating a superficial cavity in the superior central. I did not have time to insert a gold filling, so I filled with phosphate and made another appointment. I put the lamp behind that tooth when she came again, and I was very much frightened. I dismissed her, postponing the final operation from time to time for nearly three months. To-day that tooth is as dead as any tooth ever was.

I have had failures, ascribe it to whatever you like; the fact remains that I have not succeeded in some particular cases, when I have in many others. Prof. Barrett, of Buffalo, had a young man for whom he wished to remove a section of the inferior maxilla for necrosis, from the first bicuspid to the third molar—the teeth having already been extracted. With three dry cells, twelve minutes' application and a saturate solution of cocaine, the operation was half completed, and a renewal of the application for the same length of time with the same number of cells, completed the operation without the least particle of pain. I have tried since, and have not been as successful in cases of less magnitude. Failure is often due to lack of experience, more than to any fault of the apparatus.

I think the possibilities of the use of the electric current in dental practice is beyond our conception. There are so many purposes for which it can be used, of which most of us little dream, for instance, diagnosing obscure inflammatory conditions of the peridental membrane. Where it is impossible for me to detect it in any other way, with a mild current the patient will respond when the sore place is reached.

Discussion.

Dr. W. J. Morton, New York.

The first point discussed by the essayist was in relation to the source of the current, whether we are to use the battery or some form of the street current. Dr. Van Woert seemed to be laboring under the impression that I hold views antagonistic to his own, in relation to that subject; he seemed like a man who was marshalling a vast army to crush a gnat, or rather to attack a man of straw, he himself having set up the man of straw.

Objections to the Street Current.

In my very first utterances on this subject, in an address delivered before the First District Dental Society, in New York City, in January, 1896, I took a great deal of trouble to explain that these two sources of current were at the command of the profession, both dental and medical, and to record my preference for the battery; and I gave several reasons, which I think are even better than those given here to-day. One of them was that the street current, namely, the Edison one hundred and seventeen volt continuous current, was inevitably to some degree a fluctuating current, and I mentioned the fact that I had put a telephone into my own street circuit, and while it was deliver-

ing such a current as would anæsthetize a tooth, I was able to distinguish slight electric fluctuations of the dynamo at the station. That shows that it was not a perfectly corrected or commutated current, and one that could be trusted for such delicate work as cataphoresis in a tooth. I was a little amused and confused by this array of letters, but, as Dr. Van Woert himself said, that most of the letters disagree, I think we may agree that they all neutralize each other, and are, therefore of little value. This question of danger in the street current is one that has been before every one interested in electro-therapeutics for many years. In my own teachings I have always recognized a certain amount of danger in using it. It has been claimed that danger may be averted by using a safety plug. In reply to that I say that when the safety plug melts, according to the law that in a conductor at any given and equal cross-section all parts of the current are equal, the patient's head would be "melted," also. There is a certain amount of danger in everything; there was danger in coming here on the express train—we might have gone off the track.

I would like to ask Dr. Van Woert where the Edison three-wire system has suffered any harmful results from coming in contact with or "crossing" the trolley or electric light wires? Has it ever happened in anybody's house?

Dr. Van Woert. I have heard of fires being caused.

Dr. Morton. I mean where the Edison wire touched the electric light wire?

Dr. Van Woert. I never have.

Dr. Morton. You see Dr. Van Woert warns us against something that has never happened. There might be a chance of anybody getting a grave shock, of course. You can go through life and never get hit on the head by a brick from a roof top. For electro-therapeutic purposes the street current is as a rule a comparatively painful current, and the battery current is steady and not as painful. I have always used the battery current and the first two cases that I ever anæsthetized in Dr. Rhein's presence, were with a battery composed of Leclanché cells.

Dr. Rhein. What opinion have you of the chance of the street current being regulated, if it were crossed by an alternating current and the communication was through one of the rheostats that we use with the Wheeler apparatus? What importance do you attach to the claim of the manufacturer that no greater amount of potential force would pass that instrument than if it were not crossed?

Dr. Morton. I do not attach much importance to that. It would burn out everything, and at the same moment

might injure the patient. It is true, however, that in a shunt rheostat, such as the Wheeler instrument, danger is lessened.

Dr. Rhein. In burning out an instrument like that, would it not at once sever the connection?

Dr. Morton. It would sever the connection, but in severing the connection the patient would at the same moment receive a shock, for the current at any part of the circuit is the same, and the patient would suffer at the same moment that other parts of the circuit were severed. One part might be as fine as a spider's web and the other as heavy as a crowbar, and the same amount of electricity would be flowing through at any cross-section point.

Dr. Rhein. In other work, aside from desensitizing dentine, say, for electro-therapeutic work on dentine, where the pulp has been removed, we find the resistance much greater if the end of the root has been sealed. Life being practically extinct in the dentine, the resistance, in my experience, is increased, and it requires a great deal more potential force to obtain the desired effect. I would like to have Dr. Morton's opinion as to using in a city like New York, where the wires are all underground and very carefully laid, the Edison current, or a very extensive and cumbersome battery that would be necessary to get as high as eighty volts of current.

Dr. Morton. I should get current enough to do my work and take that which was most convenient, and would do the work the best. It is easy to have thirty or forty Leclanché dry cells, which would last for years. I have both in my office and use whichever I like. I do not wish to condemn the street system entirely.

Dr. Rhein. Would you consider it reprehensible to make use of the street current in New York, where it is necessary to get a high potential?

Dr. Morton. Not in the least. I use the street current daily, although I would not use it through the head from side to side. I think the street current is a part of modern civilization and progress, and people nowadays are trying to have as easy a time as possible under the great pressure of living.

The next point I have noted is Dr. Van Woert's statement that the positive pole dries the tooth.

Dr. Van Woert. I said it solidifies the tooth.

Dr. Morton. Then you mean that it was solidifying, because it was a drying pole?

Dr. Van Woert. I meant it coagulated the nervous matter; not that it dried it.

Dr. Morton. Both poles are about equally "solidifying." If you put the white of an egg in a glass, both poles will coagulate it. The eschar produced at the positive pole is more mummifying than that produced by the negative. The negative is wetter. In that sense the positive pole might be a coagulating pole, upon your idea that it was dried out. The positive pole acids and the negative pole alkalies both coagulate albumen. I have made the experiment dozens of times, so I know it to be true. By making an ordinary application the resistance is reduced, and more current flows. The only record in this respect that is worth anything is the milliampere meter. As a rule when you apply a current to the dentine, the resistance diminishes gradually.

Proper Electrodes. Now as to the importance of the fixed electrode, I was interested in Dr. Van Woert's ingenious electrode, fixing it in by the aid of a spring. I see no objection furthermore to putting the negative electrode in the mouth and thereby reducing the resistance and using less electromotive force. Dr. Van Woert, in making a plea for the use of his fixed electrode, said it was uncomfortable for the operator to stand for fifteen, thirty or forty minutes or more. That is unnecessary. I do not see why anybody should consume more than six or eight minutes, and if it only takes that time, he should stand there and hold it. If he wants to administer the cocaine properly, he should have the applicator in his hand and his eye on the milliampere meter. I see no reason why a man should exceed ten minutes, and I think soon the time will be reduced to five minutes. So the matter of the fixed electrode, while it is very good for the fifteen, thirty or forty-minute application, would not be necessary for the short application.

Dr. Van Woert spoke of imperfect electrodes and showed one of his own, and I think it is a very good specimen of an imperfect electrode. His electrode is about a millimeter in diameter—about as thick as a cambric needle. We have all been using too small electrodes, and this is one of the points I want to emphasize. We must get back to a fundamental law of physics, known as current density.

Current density is expressed in terms of the quotient of the milliamperes flowing divided by the cross-section area of the electrode expressed, say, in square centimeters or millimeters. For instance, your current strength is three milliamperes and the section of your electrode is one millimeter; $\frac{3}{1} = 3$, representing density. Again, with three milliamperes of current the section of your electrode is three millimeters; $\frac{3}{3} = 1$; obviously, in the second instance, by increasing the size of your electrode,

other things remaining equal, you have diminished the density of your current, and thus made it more bearable to the patient. Pain is the one principal limit of administration, and if in the first instance a current density of three caused pain, in the second instance (where you have increased the size of your electrode) and are getting but a density of one, you could increase your current to nine milliamperes and get no more pain than before. In short, the smaller your applicator, the more violently your current is thrown against a given point. I have reduced this question, for convenience, to this axiom, namely, that the cross-section area of the applicator should be as nearly as possible equal to the cross-section area of the cavity. We have all been using too small applicators. We are all looking for causes of failure in producing cataphoric action, or for reasons why the process is slow. This question of the size of the applicator is evidently one of the reasons.

Causes of Failure.

Again, suppose a cavity is filled with absorbent cotton, on which is a solution of hydrochlorate of cocaine. Most of the cataphoric action will be expended on the cotton, corresponding to the distance of the metallic part from the dentine. I think many cases of delay are due to this fact, that the operator is producing cataphoresis of absorbent cotton, rather than cataphoresis of dentine. To obviate this error you must get your applicator closer to the dentine. Dr. Van Woert puts a piece of tinfoil into the tooth and that answers the purpose. The applicators I have advised are in two shapes. One is of a brush shape—a number of small wires with a collar on, so that when the collar is pushed down the brushes are close together and small, and when it is desired to have it larger the collar is pushed up.

Still seeking for causes of delay, I think a great deal of it depends upon another phase of the nature of the electrode that is used, and this I will now refer to. At the time I first practically took up cataphoresis, in 1888, I found a great trouble was with the electrode when we wished to produce a numbness of the skin. We took an electrode of about one inch in diameter, put it on the skin, with a piece of blotting paper between it and the skin, and after ten minutes with ten milliamperes of current, we got a numb spot on the skin, with cocaine. Frequently the blotting paper got dry, and always in a given spot, and we generally in such a case had a little slough. I succeeded best with a piece of block tin, one-quarter of an inch in diameter, having drilled holes into it as frequently as possible on the face—little holes that passed about one-half the length through. The applicator which I advise is of block tin or of platinum, which is made tubular, so that it will hold the solution of hydrochlorate of cocaine,

and if it has these drill-holes in it, like the strainer of a pump, it will continually keep fluids in it. If the proper electrodes are constructed and come into use, I see no reason why the time will not be greatly shortened.

Leakage.

As to leakage, it hardly seems essential to speak of that. Of course, if the rubber dam is not tight, some of the current will go that way. The current does not seek the path of least resistance, but it seeks all paths that are presented to it in ratio to their respective resistances. I do not want you to think that if a nice stream of saliva would present itself, the current would all leave the dentine and go by that pathway. Some of it would, some of it would not.

Effect on Pulps.

Dr. Van Woert made the point that some of you who use high potential will get into trouble. The impression I got was that if you use the potential high you are likely to kill the pulp, and if you use it low you are not so likely to do so. The potential would seem to me to have nothing to do with it, unless you reported the number of milliamperes flowing.

A Diagnostic Agent.

As to diagnosis by aid of the faradic current, that is a very important point. Apostoli, of Paris, lays considerable stress upon it. I think by the aid of the finger conveying this current and touching the vicinity of the roots it is possible to tell by expressions of the patient whether there is inflammation there or not. We use the faradic current for diagnosis in general electro-therapeutics in inflammatory conditions about the body, and why not in the mouth in the apical region of a tooth?

In the course of my remarks I have brought out the only point that I myself wish to present here definitely, and that is the question of current density in relation to the size of the applicator. I think the applicator must be universally enlarged by all of us. It must be made to go deeper into the tooth with less absorbent cotton, and drill-holed all over, or made in some way by which the fluids can be retained by capillary attraction. It stands to reason that with a big applicator you will get four or five times as much current at work on the same tooth in the same time, as with the small applicator, and with no greater pain.

Dr. Wiksell.

How do you find the current affect the softened tissues? Do you find the blood vessels relax and become engorged?

Dr. Morton.

In soft tissues the first action is intense narrowing of the blood vessels and a disengorgement of blood. The part is extremely white and looks like tallow. If the current has been quite strong, a slough will occur. If

the tissue is not absolutely killed, there will be first ischæmia and then hyperæmia. The killing of the pulp I think will be one of the prominent questions for discussion in the future. I think an isolated case is of very little value, and Dr. Van Woert does not really know that the case he speaks of was not dead or dying before he began.

Dr. Van Woert. Any tooth that you anæsthetize will have the same appearance as the one which I have reported. It will appear darker after the application of the current, and the cocaine makes it still darker.

Dr. Morton. That is curious, because the cocaine and the current both produce a narrowing of the blood vessels. Dr. Van Woert transilluminated this tissue. It is usually recognized that any foreign material or any necrosed tissue fails to be transillumined and reflects light instead of allowing it to pass through.

Dr. Ottolengui. It seems to me Dr. Van Woert brings a serious charge against cataphoresis when he says that a pulp might be killed. I do not think his evidence is sufficiently conclusive. I do not think that the opacity of a tooth which has been subjected to a cataphoric application, as reported by Dr. Van Woert, is due to any injury of the pulp by the electric current. If that were true, if the capillaries of the pulp were unduly constringed, and the pulp tissue as a result could not transmit light, then when transillumination were attempted we would note along the center of the tooth a dark streak only. I have seen these dark stripes in teeth where within twelve to twenty-four hours after a blow there has been a rupture of the capillaries of the pulp, causing an engorgement. A few days later we have a transfusion of this overflow into the dentinal tubuli and the entire tooth becomes dark. If the whole tooth within a half-hour becomes opaque, we must seek for the cause elsewhere than in the pulp. I would be inclined to believe that this opacity were due to dehydration. I think Dr. Van Woert would find the same result by merely isolating a tooth with rubber dam, long enough for it to become dry.

Dr. Morton. I would like to speak of another branch of cataphoresis. I do not like that term—I prefer to speak of electric diffusion, or electric medicamental diffusion, because when we speak of cataphoresis, it may be that we have a case of anaphoresis. In a paper which I sent to the Dental Section of the International Medical Congress, to be held at Moscow in August, I made a proposition to substitute the word "phoresis," and we will speak of the phoretic action instead of the cataphoretic or anaphoretic. One property of this current is to produce a numbness of the sensitive structure of the tooth. That is a very charming thing to do, granted that it is fully accomplished.

Electro-Sterilization. But there still remains a most important field of inquiry and research to the dental profession. Not only will the electric current diffuse cocaine, but it will diffuse any other substance that is in proper relation to the electrode, not only in the tissues of tooth, but throughout the immediately neighboring tissues. These neighboring tissues may be the seat of disease, and it may be put as an axiom that a diseased tooth is an infected tooth. Not only may the pulp be infected, and is infected, but also the dentine and the apex of the root and every other surrounding part. The proper thing to do to a diseased tooth and its adnexa would be to disinfect it—to sterilize it—and that is exactly where I believe the great future of cataphoresis, or phoresis, is. We may use the positive pole and any agent that can be carried into the structure of the tooth. If it is a disease external to the tooth, as pyorrhea, the positive pole of your battery may be made of zinc, silver, copper or iron, preferably of zinc or silver, because they do not stain tissue. The electric current being turned on, the positive pole makes a new agent, an oxychloride of the metal and pushes it into the tissue and so medicates it. In the case of a dead pulp, peroxide of hydrogen or chloride of zinc or whatever one wishes to use may be introduced, and forced into the dentine exactly as the cocaine was. You can disinfect your tooth from every point by cataphoresis, you can seal the apical end of the root-canal and disinfect the dentine only, or you can disinfect the pericementum and adjoining tissue, and if you have done all that, it ends by saying that an infected tooth, which is a great bugaboo, as I understand it, can be so treated as to become a solid and useful tooth.

Pressure-Anesthesia. I think I can say another word on this subject of benumbing sensitive dentine, that may be of value. I want to suggest a little plan that I think anybody can put into operation in a certain percentage of cases, and if it is only ten or twenty per cent., it is an agreeable thing to have an alternative procedure. Every dental practitioner has been in the habit, where possible, in order to bleach a tooth, of putting in a piece of absorbent cotton and sealing it in, the cotton having on it some peroxide of hydrogen and sulphuric ether. The sulphuric ether by evaporating is supposed to force the peroxide into the tooth, and causes bleaching. That may be a false doctrine, but it sounds plausible enough. It occurred to me that I might dissolve hydrochlorate of cocaine in ether and thus in the same manner produce anæsthesia, but I tried it and found that the cocaine salt would not dissolve in the ether. The idea clung to my mind for some time, and I finally dissolved my cocaine in guaiacol. I made a strong solution and added half and half of sulphuric ether and there was no precipitation of the cocaine. I had a very small test tube

on the table, and I put some of the solution of guaiacol sulphuric ether and cocaine into that tube, pressed the mouth of the tube on may arm and asked my assistant to time me; I held it there quite steadily for five minutes, the heat of my arm and of my hand in the meantime causing evaporation of the ether, then tipped it over, wiped off the superfluous guaiacol and sulphuric ether and, taking a needle, I found my skin was numb. I had made an experiment that established a new order of things, which I have christened pressure—anæsthesia. I think it is for you to judge, but there will probably occur to you cases where you would prefer this simple solution to using the battery. I throw out this suggestion, which I myself have already verified by experiment, and I hope some of you will try it and report on it.

Dr. Rhein. I have long looked forward to the time when a cavity could be prepared without much pain. In 1886, I introduced the use of chloride of methyl for this purpose. I use it at the present time for dental purposes, but I abandoned its use for desensitizing dentine, as soon as I became convinced of the practicability of cataphoric medication, because in the use of chloride of methyl, I feared the result that Dr. Van Woert reports today—the possibility of pulp injury. I never have had one case where I could certainly attribute the loss of the vitality of a pulp to the use of chloride of methyl, and yet I could believe that its use might produce that result. In the extended use of cocaine cataphoresis for sensitive dentine, leaving the applications on for extensive periods of time, up to a whole hour, I have yet to find a solitary case where I have had the slightest fear as to any such result following.

Dr. Wiksell. Would not the injury follow very soon after, if it were to follow at all?

Dr. Rhein. I think it would. I believe in this case that Dr. Van Woert reports that there may have been other causes for the death of the pulp. There may have been an inflammatory condition of the pulp, or many other causes for the final unfortunate result. From one case of that kind, I should be loth to change my belief. If the cataphoric use of cocaine can endanger the vitality of a pulp, that will be a serious bar against its use for desensitizing dentine.

Dr. Allen. I want to call attention to one point, that is rarely mentioned when cataphoresis is brought forward, and that is, that cataphoresis is not to be applied to all cases coming into your hands. Pain is one of our best diagnostic signs of the condition of a tooth, and it indicates to us many times how we should treat a tooth and

fill it. That a small number of cells and a low potential will increase the anæsthesia and bring it about more rapidly than a greater number of cells and a higher potential, agrees with my experience. In my first use of the cataphoric machine, I used all the cells. I gave considerable pain in almost every case. Later I stopped using so many cells. I decreased my voltage and caused less pain; very frequently one-fifth of a milliampere was sufficient to produce anæsthesia.

Dr. Wiksell.

One day I dropped the point of my wire electrode and could not find it, and I took the platinum nozzle of the pyrozone syringe, which is made in the form of a common medicine dropper.

Tube Electrodes.

Without thinking of the advantage, I dipped it into the solution and placed it on the cotton. Now it occurred to me as Dr. Morton was describing his applicators, that the same principle is involved, and that platinum tubes could be easily made by rolling platinum wire into rounded corners, dipping it into the solution to carry several drops, and using it to keep the cotton moistened.

Dr. Van Woert.

I only wish to correct an impression that Dr. Morton's first remarks might give, that I claimed to have presented to you perfect electrodes. I did not say they were perfect; they are to me an advantage, in that I do not have to hold them. I said they were imperfect because they did not cover the entire area, and I had to use tinfoil over the cotton. That was a very imperfect conception of what Dr. Morton has shown us—of the electrode that he proposes to make for dental purposes. Those he has used in general electro-therapeutics, of course, he is familiar with; but I am afraid if he were to undertake the introduction of an electrode of that principle into some of the cavities we have to handle, he would find it difficult to drill an appreciable number of holes to hold the medicament. There are many cavities where that kind of electrode would be desirable, but there are cases where it would be impossible to use it, so I think there is a use even for the imperfect electrodes which I have presented.

Fallacies Observed in Dental Practice.

By J. ALLEN OSMUN, M. D. S., Newark, N. J.

It may be a fallacy for me to think that I can interest you by reciting a few observations made during the few years I have been in practice. It may recall to your minds that story of a well-known clergyman expostulating with an erring brother, who was addicted to over-indulgence in "ardent spirits." He said, "Just think, my dear brother, of how one feels the next morning; the distressing headache, the nerves all of a jangle, and the depressed condition of one's mind." Whereupon the culprit grasped the clergyman's hand, and said, "Ah well, you must have often been there yourself; you describe it so well."

Be this as it may, I am convinced that it is a fallacy for any one to think for a moment that he is perfect in his operations, and I am equaly convinced that one is liable to get into a rut, and fail to perceive errors which he may be committing daily.

We have a great many essays telling us what to do. This little effort will be largely directed to describing "what not to do."

Preparation of Cavities.

The preparation of cavities opens a large field for discussion, but I only wish to touch upon a few points. I consider it a fallacy to expect good results when cavities in bicuspids and molars are so prepared that tooth substance is allowed to come in contact with the tooth substance of the adjacent tooth, instead of being cut away and replaced with filling material, whether it be of gold or amalgam, and the filling so contoured that the fillings impinge one against the other.

In seeking the cause of failure of filings made by other operators, as well as by myself, I have been convinced that a large percentage have been the direct result of this mistake, coupled with the fear of cutting away all thin edges. These two faults are the twin causes of failures in this class of operations. Of course, in some cases the cavities were not properly shaped, so as to retain the fillings when the pressure of the antagonizing tooth was brought to bear in mastication, but the cases of failures that could be attributed to this cause were few.

We once heard a great deal about defective manipulation, and incompatibility of tooth substance and filling material, but in these later days we do not see it so often in print, or hear it referred to so frequently

in society meetings, but, that the cause of failure is due more to defective manipulation, than to incompatibility of tooth substance, and filling material, is no fallacy, but a stern and unrelenting fact, which any careful observer can easily demonstrate to his satisfaction.

Amalgam versus Gold.

We are reading again in the journals and hearing at dental meetings, arguments on the old question of amalgam—its virtues and defects. To say that any one can successfully practice dentistry to-day without its use, would be ridiculous. It has its merits, but, gentlemen, I must say that I am convinced that a great fallacy exists in regard to its use. Can it be that because amalgam is a so-called cheap filling, it can be inserted without care, with any well founded hope for good results? Or is it that because it belongs to the plastics it is to be regarded as so easy of manipulation that it does not come under the head of skillful operating? Or is it true, as one operator told me, "one can make twice as much money by using amalgam and not work half so hard, as he would if he filled with gold?" Something of this kind of reasoning must fill the minds of many operators, or else we are being woefully deceived in the material itself. Personally I am convinced that a great error is being made by its indiscriminate use.

Only last week I had the pleasure of speaking with Dr. Flagg, and what I am about to say, I wish to say with the greatest amount of courtesy to him. I always feel like taking off my hat in his presence, for I believe there is to-day no man in the dental ranks, who has been such an enthusiastic worker in endeavoring to raise the standard of dentistry, sacrificing mind and body and soul for its benefit; yet I believe that Dr. Flagg has done more injury to the dental ranks than any man we have. I believe him to be as honest as honesty itself, and as true as true can be; nevertheless, with his earnestness and enthusiasm, he has boomed plastic fillings until he has carried away young practitioners, and done an incalculable injury to them. I do not wish to detract in the least degree from the value of plastics, nor from the work of Dr. Flagg. All honor to Dr. Flagg! But in his enthusiasm he has failed to say, "Look to your environment; be careful of your surroundings; weigh the possibilities and the chances!" He has gone on until men have been swept off their manipulative platforms, and they have lost their delicacy of touch, without which dentistry is a flat failure—a curse. I hold that wherever possible, taking into account frailty of walls, ability of patient to undergo the ordeal of the operation, and to meet the financial requirements, gold should be used and that it is a fallacy to fill such teeth with amalgam. I am compelled to assert, that in a practice extending over twenty years, with unexceptional chances for scrutinizing the work of

other practitioners—operators of undoubted skill and ability—and my own as well, that when gold is placed in correctly, in properly prepared cavities, that it is "no fallacy" to assert that the best results will and do follow. Yet I must also say that it is a wonder, I was about to say one of the seven wonders of the world, how well amalgam does save teeth when so often, aye almost always, it is done so poorly. Yet in spite of this admission of its usefulness I wish again to reiterate my former statement, that gold will produce the greatest number of successful operations, provided the cavities are prepared correctly, the gold placed in position in small bits, and thoroughly impacted and properly finished.

Rubber Dam.

Another fallacy I have noticed by observations and conversation, is to think for a moment that a really first-class operation can be made of a permanent character, without the use of a rubber dam, unless it is a small crown cavity or one exceedingly accessible. I expect this will be combated vigorously, but I think it can be demonstrated beyond doubt. I will also admit that there are cases and situations when it is well-nigh, if not altogether impossible to apply the dam, but nevertheless it is equally a fallacy to think for a moment that the particular operation was as well done, or will give the satisfaction that it would had the dam been adjusted, the cavity thoroughly dried, and the condition of the tooth substance, margins, etc., thoroughly examined, as it cannot be done by any other method.

Anterior and Posterior Cavities in Bicuspids.

Another fallacy. In the preparation of cavities and filing of bicuspids, I would like to refer to cases where there is an interior and posterior cavity extending entirely through the tooth, leaving the buccal and palatine cusps standing alone. To fill this class of teeth without some kind of protection or reinforcement is to invite disaster. I could not recall the number of split bicuspids that have fallen into my hands for repair, sometimes the outside and sometimes the inside gone, frequently far under the gum margin. I freely admit it is a perplexing question to decide how to proceed. Allow me to illustrate by citing a frequent type presented for one's services—a superior bicuspid—it is almost always the upper ones, as the lower do not present the same difficulties. We will say a first bicuspid, having on its anterior surface a gold filling which the patient informs us has been in, say, for three or five years, in good condition. There is disclosed on examination a deep and large posterior cavity, extending well up into the crown with a sulcus or fissure extending forward, and meeting the filling already in the tooth. On excavating the pulp is not found exposed, although the cavity is deep.

Where the pulp is exposed or entirely gone, the plot deepens. Well, here you are, a narrow tooth, not much tooth substance to start with, already a filling of no small dimensions in the tooth, a large posterior cavity invading the sulcus of the crown, leaving two thin projecting cusps, standing as walls to retain these two fillings, and bear the strain of mastication. Now to think for a moment that success will follow the operation, without reinforcement or strengthening the walls, is a fallacy, pure and simple. Some scheme must be adopted to strengthen these frail walls, or there will be a grand smash, sooner or later. I have been there! I obviate the impending danger by various devices. I will mention one or two of the most favorite ones. If the cavities are large and there is quite a loss of tissue, I grind down the tooth substance on crown and carry the gold filling over the ends of the cusps, so that no tooth substance can receive the blows of the lower tooth. The inside cusp I cut away a good deal, the outside only so much as I think necessary to make it secure. I then remove all or part of filling that was in the tooth, build up and contour with heavy rolled gold, and usually get satisfactory results. There is not much gold in sight. Another favorite way is to pierce both cusps as near the gum line as I can, and not endanger the pulp, put in a screw, set in cement and then fill the cavity. I also cut out the end of screw and fill the small cavity thus made, which precludes any danger of decay around screw. This reinforces the tooth and makes a desirable result possible. We often have molar teeth come to us split through the middle, and either outside or inside broken away, because there was not a reinforcing with a lining to support the frail walls. In a word, it is a fallacy to suppose that frail walls will support a large metal filling without assistance.

Fallacies in Crown and Bridge Work.

In crown and bridgework I have observed a great many fallacies, for instance, I see bridges placed upon teeth affected by pyorrhea alveolaris, the teeth sometimes being very loose in their sockets. How any one can imagine that teeth, already loose in their sockets, and thus affected, can support a bridge of three or four teeth, and in some cases more, is inconceivable to my mind, unless it is on the theory that once actuated a certain young man who contemplated matrimony. He was expostulated with, his attention being called to the fact that he could not support himself as a single man, and was asked how he could possibly expect to support two. He replied, "Well, I can almost support myself, and it is a mighty poor woman that can't help some."

This may be all right theoretically, but in the stern, practical, every-

day experience, it will not work, and hence it is that I have removed a number of bridges, when the mechanical and constructive work had been beautifully done, after a brief, a very brief career, I will not say of usefulness, leaving the victim in a worse plight than at first.

Another erroneous method of crowning and bridges, is when a tooth is banded and secured by screws. I have yet to see the first one that either was not loose, or the band inviting decay, and the invitation being accepted with alacrity. Other failures in this class of operation will suggest themselves; suffice it to say, that one cannot violate the basal principles of mechanics and hope for success. I must not pass this subject until I give expression to my abhorrence of extension bridges and saddles. This, to my mind, is about the most colossal fallacy of which I know. To put one of the most powerful mechanical devices, viz., the lever, in the mouth, on yielding foundations and with every bite in mastication moving it more or less, and not expect the abutment to be wrenched and loosened, is beyond my comprehension, not to mention the accumulation of debris under the plate, to sweeten the breath I suppose? "Truly a house built on the sand, cannot withstand the storms," and this style of replacement cannot be likened to the "house built on the rock."

Dental Pulp.

The conservatism of the dental pulp used to be a subject much written upon, and many methods were presented whereby an exposed pulp could be covered, and its usefulness preserved. I am conviced by close observation of operations of this kind in my own practice, and those coming under my notice in the mouths of patients from other practitioners, that there is no greater fallacy than to expect to get any permanent results from capping exposed pulps. Once exposed and having given pain, I am convinced that it is the correct practice and one to be commended, at once to devitilize and extirpate the pulp, and to disinfect and fill the roots with the full consciousness that you have done the very best for your patient.

Another fallacy, and one which cannot, in my judgment, receive too much condemnation, is to leave decay in a tooth with the vain hope that, if it is disinfected, it will recalcify again. I learned the lesson with bitter experience, that all decay should be removed, and if in so doing the pulp became exposed, remove it also; better, far better, have a tooth free from carious substance entirely, pulp absent, pulp chamber and roots cleaned, disinfected and filled properly, than to leave decayed dentine as a covering over an irritated pulp, and it always will be irritated when you have such deep cavities.

Prosthetic Dentistry.

In Prosthetic Dentistry, I observe a grievous error in not supplying the full lower denture, when a full upper set is to be worn; in other words, both jaws should have a full complement of teeth, either natural or replaced by bridgework or a partial plate.

I find this state of affairs frequently: a full upper set of artificial teeth and six or eight natural lower teeth. The result is that the entire force of mastication, coming on the front part of the aveolar bridge, breaks down the hard tissue, causing an excessive absorption, entailing on the unfortunate victim an ill-fitting denture and one exceedingly difficult to make satisfactory. When this result does not occur, and there are some cases when the ridge seems to withstand the extreme pressure, then there is an equally serious result, viz., the mechanical abrasion of the lower six front teeth; sometimes they are worn nearly if not quite to the pulp.

A little foresight and insistance on the part of the dentist would have prevented these unfortunate and expensive results. The excuse often made by the patients, that they cannot afford the expense, is not to be entertained for a moment; they cannot afford not to have the work done properly, and if the matter is placed before them correctly, there will not be many objections raised—this premises that the work shall be skilfully and carefully done—and if a patient refuses to allow an operator to do what his enlightened and trained judgment dictates, he should in all honor decline to perform the operation, be it surgical, mechanical or operative.

Systemic Treatment.

The systemic treatment of patients by the dentist has been much written upon and discussed in the journals. I cannot recall a greater fallacy than for a dental practitioner to attempt to prescribe for a patient outside of his specialty; his training, his limited opportunity for acquaintance with his patient, his inability to obtain that knowledge which comes only by experience, would seem to me sufficient reasons for his abstaining from that kind of knowledge gained from books alone—"Heaven defend us." For a dentist in active practice to prescribe outside of his specialty is on a par with the brilliant results we sometimes have when a physician attempts to treat a putrescent pulp or an advanced case of peri-cementitis or to give his advice in a case of regulating.

Accepting Theories without Proof.

I believe that it will be profitable to consider a tendency of the dental profession, which, if carried to extreme, becomes a fault, but which if not embraced to a reasonable degree, may become a worse evil. I allude to a too ready acceptance of

any line of treatment—or adoption of any new method of operating—without a full comprehension of the principles involved. By way of illustration, Dr. N— presents an interesting paper describing some new method of treatment. Dr. B— is pleased with the description and decides to adopt it, and does so, but gets entirely different results than those claimed by Dr. N—. Why the difference? Dr. B— failed to get a clear idea of the principles involved in the operation.

Another phase of this same question. Dr. N— performs an operation involving something new, and if it is successful for ninety days he calls it a success and writes it up. Others follow the rules which he lays down. Result: failures. A little more thought, a little more investigation and its weakness would have been apparent; both patient and operator would have been saved much annoyance and discomfort. Now, this carried too far on the other hand makes an old fogy; to keep in the "middle of the road" requires vigilance and much study, and a careful, honest purpose to do the best for one's patients.

Pyorrhea Alveolaris.

In speaking of the treatment of this disease I must at the outset say that it is a fallacy to think that it can be cured, if it is a true case of pyorrhea. Many cases come into the hands and under the care of an operator and he has such a wonderful result by removing foreign deposits and stimulating the gum tissue that he at once pats himself on the shoulder and proclaims that he is "big Injun," when in truth the cases no more resemble true pyorrhea than sunlight does cloud. Pyorrhea can be alleviated, and by constant care by both patient and operator, the final result can be put off into the future—for a greater or less time—but to cure a case of this disease is impossible at the present time. I have seen quite a number of cases, which have been cured; and the patient dismissed with a benediction, but, alas! the last state was worse than the first.

I must bring this little talk to a close, but before doing so I want to speak of two other subjects. I can only touch upon these fallacies lightly; to go into details would fill a volume. We have heard quite a good deal about our being a "specialty of Medicine." I presume when the dental profession was in "swaddling clothes" they did look longingly to the time when they might become a member of the firm of Healing & Co.—otherwise known as the medical profession. But, gentlemen, that time has gone by. Dentistry has grown to such proportions that she no longer looks to be "recognized." Dentistry is recognized as an independent and distinct profession, and the day is not far distant, in fact, the dawn is now breaking in all its fullness and glory, when the dental profession will have as many specialists within its ranks as the medical profession has in its fold; and each one will require as much

preparation, as much culture and be possessed of as much skill for its successful practice as any specialist of our sister profession; and this is in no wise to be construed as detracting from the glory and the honor which belongs to the medical profession.

Code of Ethics.

A dental paper of this character that did not touch upon that ubiquitous, and shall I say vital question, Ethics, would be lacking in flavor. Well, gentlemen, I suppose we must have a "Code," but to my mind it is a fallacy, pure and simple, to think that you can legislate a man to be honest to his brother practitioner. I think from observation that the code is too long, too cumbersome; that it attempts to build too high a wall about us. I feel convinced that we ought to have more of the missionary spirit—to go out into the "by-ways and hedges, and compel them to come in." By association and precept and by example we should show to all of our brother practitioners a better way. In other words, put the bars down lower, so that all can come in and see that in fact as well as in name, we do have a brotherly feeling towards them and teach them that no greater fallacy exists than to think for a moment that they can afford to be on the outside; that by association with each other we give out and receive a great deal of valuable information.

Patients not Property.

One more fallacy and I am done. Do not labor under the idea that because a person comes to you one or more times he is your personal property, or that you have the first mortgage on him. If you see or hear of his going into your competitor's office do not jump to the conclusion that he has used some underhanded means to induce the visit. A person while in your chair and in your hands is your patient; when he leaves your front door he is not yours until he returns to your office. Do not labor under the fallacy that a dentist owns his patient.

I should perhaps have spoken upon that vital question and one I deem of more importance than any "Code," and it is "Dental Education." I do not mean dental education of the dentist, but of the great public. When they are educated so they can discriminate between the skilful and the unskilful, between the honest practitioner and the shyster, then the code will be a power, for behind it will be that great lever—public opinion.

Discussion.

Dr. G. P. Wiksell, Boston, Mass.

The point that a lever never should be used in the mouth, I think is too strong. I have two such bridges that have been doing good service for seven or eight years, where plates had been worn many years previously. Both cases are alike—the bicuspids missing. I crowned the molars, used platinum saddles and put the bridges on with gutta-percha, as I do all bridges. Last year I took a pair of them off, and found no debris under the saddles, any more than we find under the free margin of the gum. They were as clean as any bridgework could be. I call that a success. During the time the bridges have been in, the cuspids have been retained. I made the bridges in this way because I dreaded to cut off the cuspids, and I did not wish to window-cap them. I do not think a short saddle is bad practice. I took the bridge off to examine it and to get at a cavity in the back of the cuspid. I can take off any bridge that I put in, within a couple of minutes.

I was glad to hear what the doctor said about letting down the bars. There is a feeling among many members of dental societies, that they are the dental Four Hundred. I will state my case. I advertised for several years in the beginning of my career when I had no friends and no practice. I started in the best part of the city. I advertised in the cleanest possible way, and never to offend my neighbors. Two years ago last January, my last advertising contract expired, and I stopped, because I did not need it any more. Like a crutch, I laid it aside. I quite disagree with men who claim that I did anything dishonest or disgraceful, but I realized that I could not be a member of the Massachusetts Dental Society. Being an honorary member of several outside societies, I applied for membership there, and was rejected on my record, although I had abandoned advertising. I shall make another effort to get in, and if I do not succeed in becoming a member, there will be another society in Massachusetts. Then if a young man is in need of brotherly advice or encouragement he will get it from me and from the society to which I belong.

Dr. R. C. Brewster, Brooklyn, N. Y.

I admit all the doctor has said against amalgam. I was not one of the fortunates who sat under the teachings of Dr. Flagg, but last winter he favored me with a visit at my house, and I learned from him things in regard to amalgam that I never knew before. I may therefore speak in defence of Dr. Flagg.

Dr. Flagg's Method of Using Amalgam.

Suppose a crown cavity in the masticating surface of a molar is prepared in the usual way. Dr. Flagg's method is to first place a piece of amalgam on the bottom and roll it around. To the top of that the excess of mercury rises, and that is thrown out; the next little piece is tapped in; the excess of mercury of that rises to the surface, and that in turn is removed and laid aside; so in successive steps this is continued until the cavity is full. The last piece when tapped upon, will bring excess of mercury to the top; this is taken out, and by a little more pressure we can make a concaved surface to that filling, which now almost fills the cavity. His method is to take those excess pieces, put them in a piece of chamois, and do what he calls the "wafering act," that is, put all possible pressure on it and remove all the excess of mercury and then go on with the same manipulation as before. A piece of the amalgam put on the surface and tapped, will again bring quite an excess of mercury; that is put aside also; this is continued until the amalgam is as hard as it ever can be. My experience with that method is that I get out more mercury than I can with gold, absorption or heat, or any other method I have ever used. So far as I can yet see, there is less shrinkage to those fillings than I ever had before.

Systemic Treatment.

In regard to the medical treatment of our patients, I agree with Dr. Osmun. That is outside the scope of our specialty. Except in very extreme cases, as saving the life of a patient, I think we should never attempt to practice medicine. No doubt you have all heard that for the obtunding of pain, it is common with some people to use 1-8 or 1-4 of a grain of morphia. I have never done that, and I have always tried to raise my voice against it. I have a patient who came to me last fall—an anæmic woman, whose physician is a friend of mine; when she came to me she said she wanted to take some morphine, as she had to have several cavities filled, and she could not come in again, because she was going abroad. I said I would not be responsible, and would not administer it. She said she had some pills of 1-8 of a grain each, and she showed me a letter from the physician, advising her to take the drug. She took one, and I did admirable work for her, and she went away in good condition. I think anyone who would attempt to do that without the support and the sharing of responsibility of a physician, would be making a great error. Two years ago, at the New Jersey State Dental Society, this same subject was discussed, and I made a statement opposing the administration of medicine to patients. Some member present had said that he had great success in the administration

of the bromides, and he reported that he had given a patient sixty grains of bromide of potassium several days before. I know that is not an excessive dose, as I have taken it myself when I was younger. I stated that if the bromides were given, it was better to prescribe bromide of sodium, because it is less irritating to the stomach. In a case I had a few days before, I ventured to give a patient whom I knew, five grains of bromide of sodium, and I had a hard time getting the patient on her feet again. The bromides are sometimes useful, but to give them to a stranger is rather dangerous. The lady to whom I gave the dose of bromide of sodium had enlargement of the heart. I did not know it, and I thought the dose would do no harm.

Pyorrhea Incurable.

In regard to pyorrhea, I would say that some years ago, I thought I knew a great deal about it, and that I did wonders. I feel now I do not know nearly as much as I thought I knew then. I have very few cases that I can look back upon and say I have cured them, and I think it is an incurable disease. We can ameliorate it and do much for our patients, but that it can be cured, I do not believe.

Dr. J. M. Magee, St. John, N. B.

Dr. Osmun used one word that I disagree with, and that is the word "competitor"; I think we ought to say "compatriot." I do not feel that any one in my city is a competitor. If there is anything I can learn from any one, I want to learn it, and if I can teach him anything, I want to do so.

Dr. C. L. Andrews, New York.

I do not approve of permanent bridgework at all. I would not put another piece of permanent bridgework in the mouth under any conditions. I have taken out my own work, and I have taken out the work of others, and I do not think such fixtures are fit to be in the mouth, no matter how loose or how strong the abutments are.

Dr. J. Allan Osmun.

I know that in bridgework and in all other operations, there are exceptions. There are special times and places and opportunities and cases that turn out wonderfully well against all our preconceived notions, and against all scientific principles. Dr. Brewster spoke in defense of Dr. Flagg. That is just what I wanted to avoid. I did not want to attack Dr. Flagg, and I hope I did not do so, in any way to require defense. It is the hardest thing in the world to criticise a man for whom you have the highest regard, and who has done a grand work. It is because of Dr. Flagg's enthusiasm and his great personal magnetism that he is liable to do wrong—not that he does it himself, but he forgets that the young

man who reads his articles has not his educated judgment, his great head and the thirty or forty years' experience that enable him to differentiate in certain cases. Dr. Flagg thinks gold is par excellence the best filling material to use in teeth of good quality, and that amalgam is only to be used in certain cases. He does not say that, however, and he tells you of amalgam fillings that last fifteen or twenty or thirty years. If Dr. Flagg says a thing is so, try to analyze it and find out what is the great basil truth behind his statement. Try to get that inner consciousness and grasp the central idea and principle. I heard him say two years ago at Asbury Park, that he could place arsenic in a tooth and send the patient off for two or three years, and it would be all right. That is a broad statement. It can be done, and it is possible; but in ninety-nine cases out of one hundred, it will cause trouble. Dr. Flagg makes these great, broad statements without any qualifications. If he said arsenic could be put into a tooth with certain environments, and under certain circumstances, and it *may* not give trouble, all right; but when he makes the statement that it may be put in any tooth and the patient go to Europe or anywhere else in safety for two or three years, I say it is dangerous teaching. Dr. Flagg does it, because he has the judgment and the experience of many years, with thousands of cases coming under his hands.

Dr. W. P. Cook, Boston, Mass.

I have been led to believe that the least amount of mercury possible in an amalgam filling is best. Dr. Brewster speaks of getting out an immense amount of mercury by gently tapping the filling. What is the advantage of having so much to begin with? Why after mixing your filling should not the mercury be removed by pressure, either with the hand or the forceps, leaving just mercury enough to render the filling sufficiently plastic to be put in position, and then taking up the surplus mercury with gold. We would almost be led to believe that Dr. Brewster got quite as much, or a little more than originally went into the filling. It seems to me that Dr. Brewster, following the ideas of Dr. Flagg, can perhaps explain why it is desirable to have so much mercury in the filling when it is introduced.

Dr. R. C. Brewster.

When Dr. Flagg mixes alloy with mercury, he does it on scales, and they are almost equal in weight. He mixes it, and after going through the process which I speak of and putting it in the bottom of the cavity, each successive piece will bring some mercury to the top. Wafering again and again, he will still get mercury when it seems almost impossible that any mercury could still be obtained. It seemed proportionately large, from the amount that had been first expressed. It is necessary to use pretty

nearly an equal amount of mercury to get good amalgamation of the alloy, because if you have less, you do not get a homogeneous filling.

Dr. A. J. Sawyer, Manchester, N. H.

Last March I had the pleasure of listening to Dr. Flagg before the Vermont State Dental Society, on amalgams, and his method of inserting them. His object of making the amalgam soft and using it soft, is the ease to the patient with which it is inserted, and also the better adaptation. He demonstrated his method there in a large tooth, and it seemed to me that he made his filling better than he would have done if he had squeezed out the excess of mercury in the beginning. I have practised the method since with great satisfaction to myself. I have used in connection with it sometimes the method that Dr. Bonwill has recommended, using bibulous paper and condensing with the bibulous paper under the instrument, that bringing the excess of mercury to the surface more perfectly.

Dr. Ottolengui.

Two gentlemen have raised their voices and said that pyorrhea is incurable, and I will ask Dr. Rhein to give us his testimony.

Dr. M. L. Rhein, New York.

I heard Dr. Osmun speak at Albany about five years ago, and my reply to him at that time is in the report of the State Society of that year. I can only repeat what I said then, in comparing the subject to any other disturbance the human body is heir to. We might as well say if a person has an attack of pleurisy, or pneumonia, or typhoid fever, or smallpox, or any other disease, that it is incurable.

Pyorrhea not a Separate Disease.

Pyorrhea alveolaris is not a disease. It represents the results of pathological changes, due to some form of mal-nutrition which leaves its effect in that part of the body which receives the ultimate portions of the circulation, and it compares in this respect with the eyes, the hair, the nails and all portions of the human economy which are fed by the ultimate tracts of the circulation. There is nothing more to any phase of pyorrhea alveolaris that presents itself to us than the fact that the parts around the pericemental tissue are suffering from starvation. I have had cases of pyorrhea alveolaris that are the sequence of every known disease. I have some which are the direct cause of anæmia—the patients virtually in a condition of starvation—and I have them in the opposite extreme, where people have been over-feeding themselves; and yet some persons speak of pyorrhea as a gouty disease, when the two most opposite extremes produce precisely the same conditions. They both produce not only this condition of a lack of nourishment in the capillaries that supply that part of the

body, but they also both cause an excess of uric acid in the circulation, which is the whole basis for calling pyorrhea a gouty disease. The great mistake of the men who first made themselves prominent by speaking of the constitutional cause of pyorrhea, was to select gout as the cause, and say that every case of pyorrhea is gouty. That has been the weak point that so many have floundered on, because they failed to find gout. Gout is only one of all the diseases that cause this trouble.

I speak somewhat autocratically on this subject, because I feel the assurance that a man can feel when he has seen with his own eyes the facts which I now state. I do not refer to those cases that have only come to me in my private practice, because a man's private practice is too small to enable him to speak in generalities; but I have paid more than one visit to the medical wards of hospitals. I often go through the wards and examine the mouths of patients, and point out the various characteristic signs that present themselves, showing to the house physicians the difference between pyorrhea in the typhoid patient, in the pleurisy patient, or in Bright's disease, or diabetes. Only a short time ago I went to the ward of a prominent hospital in New York City, and while I do not claim to have any data by which I can designate to the profession at the present time the difference in the clinical symptoms of the various diseases, I have been able to point out a certain number of them. In that round I made correct diagnoses of over ten different patients in one ward, simply from examining their mouths, without knowing beforehand what ailed those patients. I can substantiate that statement by one of the attending physicians at the Mount Sinai Hospital. I see something different in pyorrhea from Bright's disease, from pyorrhea resulting from pleurisy, or tuberculosis or diabetes, and in that ward there was pyorrhea from lead poisoning, from syphilis, from typhoid fever and from Bright's disease. I have tried to awaken the medical profession to the enormous value afforded by pyorrhea in diagnosticating general diseases, insomuch as its clinical appearance, if carefully observed, varies according to the disease that causes it. If this diseased tissue is due to Bright's disease, and Bright's disease can be cured, the pyorrhea can be cured. Dr. Ottolengui has had a case of Bright's disease where the patient was cured, and the pyorrhea was cured; two years later his patient suffered Bright's disease again, and the pyorrhea came back. If you catch a cold to-morrow you may be cured; next year you may catch another cold, but that first cold was cured.

Pyorrhea Curable.

In pyorrhea the tissues can be restored to such a condition that there is an assation of exudation of pus, and a preventive of any further loss of tis-

sue. Those tissues resume their normal condition—I do not mean that we can replace tissues that have been destroyed, nor restore the gum over teeth where it has extensively receded. That is not necessary to cure pyorrhea alveolaris. If a patient presents dying of tuberculosis, which is one of the common conditions in which I have pyorrheal patients present themselves, I tell them that I cannot do very much for them, because I know such patients will only live a few months, and it would be criminal on my part to harass them by doing any severe work. When a person presents, who has had some disease and has become well, and we have left loosened teeth with the pockets extending up half an inch around the teeth, filled with deposits and bacterial germs, so that tissues cannot act in a normal manner, I tell such a patient that if I can diagnosticate the real condition of affairs I can promise relief. If I discover the cause, which is never local in true pyorrhea, the cure of the pyorrhea should go hand in hand with the cure of the disease which caused the pyorrhea.

Dr. Osmun. Dr. Rhein and I are not so very far apart after all. Whenever we come to discuss any question of this kind, it is largely a misunderstanding of terms and phraseology. Dr. Rhein says that pyorrhea is only a sequence of disease. I think that is partially true and partially false. When a case comes in, which is the sequence of anæmia, or tuberculosis, or Bright's disease, or diabetes or pleurisy or any of the fevers—I do not call that pyorrhea.

Dr. Rhein. What would you call it, if the disease had taken place five years previously, and the patient had otherwise recovered, but you found all the symptoms of pyorrhea, as you understand it present?

Dr. Osmun. After so long a period, I would not call it a sequence of that disease. No man could, unless it were the lesion of a lung from pneumonia, or a pock-mark from smallpox, or the broken down tissue from Bright's disease. I believe that pyorrhea, true and simple, is not a local disease, nor an acute disease in the sense we speak of it. I think it is a constitutional disease, and for that reason it is incurable, because we cannot change the patient's constitution.

Dr. Ottolengui. Dr. Rhein claims that pyorrhea is a sequence of a previously acknowledged specific disease, like Bright's disease, tuberculosis, the fevers, etc. Dr. Osmun says it is not the sequence of a disease, and yet that it is a constitutional disease. Does Dr. Osmun mean that pyorrhea is to be classed as a specific, independent disease, along with diabetes, the fevers and tuberculosis?

Dr. Osmun. Pyorrhea a Specific Constitutional Disease.

That is just what I do claim. It is an independent disease. Per se, it is not the result of any of the diseases mentioned by Dr. Rhein. That they aggravate pyorrhea I will admit, but that they cause it I cannot admit. My own idea is that it does not come from external sources, but originates in the region of union of the teeth and the pericementum. I believe there is a lack of nutrition at that point. This may be aggravated by any of the diseases which Dr. Rhein has mentioned; but back of it is still another factor. The cemental substance has become so dense that no nourishment passes through it, to that tooth; and because of that non-nutrition, the alveolus is gradually absorbed, just as it is after the tooth is removed by extraction. I believe true pyorrhea can never be cured, simply because you cannot restore the function of those tissues. Pneumonia and several other diseases have a specific time to run; either the patient gets well after a certain time, or he dies. Tuberculosis is not that type of disease. A tuberculous lesion once formed is formed for all time.

You can alleviate pyorrhea, and control it, and to all intents and purposes you may call that a cure; but my idea of a cure is the eradication of a disease, and you do not eradicate it by controlling it for a few months.

Dr. Ottolengui.

I have never heard anyone else advance this proposition that pyorrhea is a specific, constitutional disease. When we speak of curing it, we mean from a dental standpoint, retaining the teeth; but the medical world at large would consider that a constitutional disease is cured, if the disease itself is eradicated, regardless of what loss is entailed in the cure. We know that the removal of the teeth affected by pyorrhea results invariably in the disappearance of the disease. If we have here simply a local expression or sequence from another disease, we can understand such a cure by removal of the teeth. But if, as Dr. Osmun claims, pyorrhea is a specific disease, then he has discovered a medical anomaly—a constitutional disease curable by the eradication of its outward local sore. Can we imagine tuberculosis cured by the mere mechanical or surgical extirpation of the ulcer at the surface of the body—without the exhibition of internal remedies?

Dr. Rhein.

I have never heard anyone make such a claim as Dr. Osmun does, that pyorrhea is a disease constitutionally, per se, the same as tuberculosis or kidney disease. I cannot conceive of any such condition of affairs. We have no organic disease of the body that can be cured by eradication in that way, because such diseases pervade the whole system. If Dr.

Osmun accepts the theory that the trouble between the pericementum and the root, is due to a lack of nourishment, it is absurd to say that the removal of that tooth is going to cure that condition of malnutrition: it will show somewhere else.

Dr. Osmun.

I heard Dr. Rhein outline his theories at Albany some years ago. Since that time I have particularly inquired whether my pyorrhea patients ever had Bright's disease, or anæmia, or pleurisy or scarlet fever, or if there had been tuberculosis or gout in the family. The answers have been negative, and I cannot find that it is a sequence of these diseases. It is a separate disease and I defy anyone to cure it, that is, to eradicate it.